DEPARTMENT OF ARCHITECTURE
ANNA UNIVERSITY, CHENNAI

VISION OF DEPARTMENT OF ARCHITECTURE

The Department of Architecture is committed to excellence in the field of architectural education and the discipline of architecture through its pedagogical, research, extension and outreach activities, directed towards the betterment of the world that we inhabit, in all realms shaped by architecture. It shall uphold universal moral and ethical values in all endeavours that it undertakes and be exemplary in creating positive transformations.

MISSION OF DEPARTMENT OF ARCHITECTURE

The Mission of the Department of Architecture is

- To tap and strengthen the innate potential of each student and deepen their knowledge/skills in order to enable them to self-actualiseas well as become catalysts for positive change.
- To contribute to immediate context, larger society and the world through knowledge creation and dissemination.
- To engage and extend the expertise of the department in addressing and solving of issues/problems related to the built environment.
- To actively interact and collaborate with professionals, educational institutions and other related organisations at all scales in order to collectively further the cause of appropriate architecture.

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REGULATIONS 2019

CHOICE BASED CREDIT SYSTEM
M. Arch (General) Full-Time Programme

1. PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

- Become an architect with ability to discern problems and identify solutions through both deep and broad parameters.
- Find gainful employment in architectural firms/ building sector through offering of specialised knowledge.
- Be a part of organisations that influence policy and decision making through contributing in-depth knowledge in relevant fields of study.
- Become a teacher/ researcher with ability to apply critical, investigative and analytical thinking towards future society.
- Become a thinker and entrepreneur who can anticipate and project future transformations in the built environment.

2. PROGRAMME OUTCOMES (POs)

After going through two years of study, our M. Arch (General) Graduates will exhibit ability to:

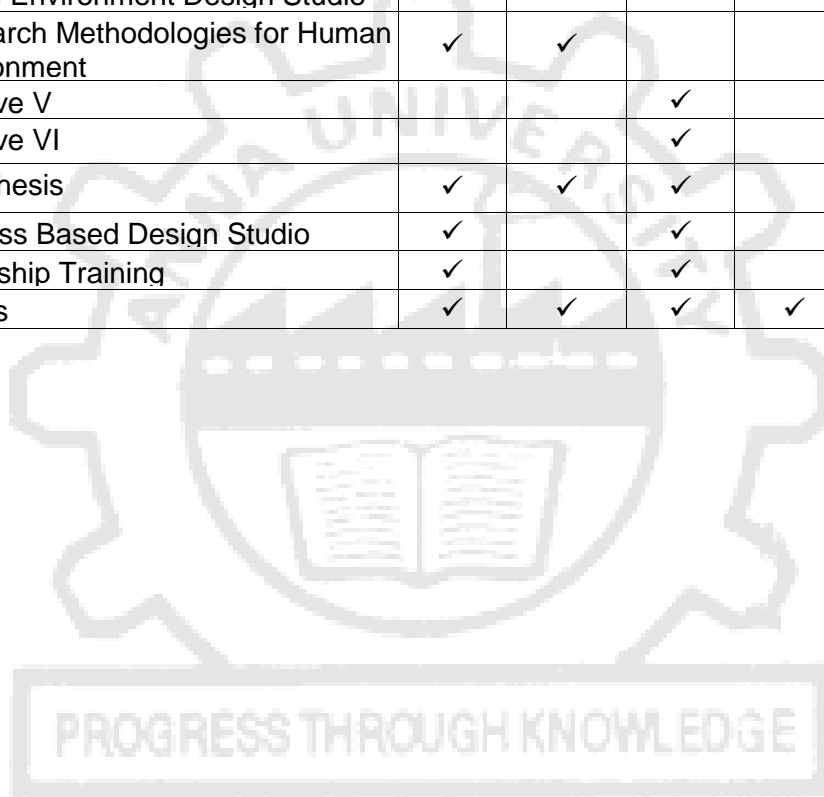| PO#	Programme Outcome
1.	Independently carry out research / investigation and design development work to solve practical problems of built environment.
2.	Write and present a substantial technical report/ research document.
3.	Intensify thoughts, techniques and knowledge with a demonstration of mastery in specific areas of architecture.
4	Resolve architectural problems with due consideration to environmental issues.
5	Look at the larger urban and social context in the making of design decisions.
6	Bring contemporary tools/ methods/ approaches to analyse situations and explore design.

PEO / PO Mapping:

PROGRAMME EDUCATIONAL OBJECTIVES	PROGRAMME OUTCOMES					
	PO1	PO2	PO3	PO4	PO5	PO6
I			✓			
II						✓
III		✓		✓	✓	
IV	✓	✓	✓			
V			✓			

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Mapping of Course Outcome and Programme Outcome

Year	Semester	Course Name	PO1	PO2	PO3	PO4	PO5	PO6
I	1	Sustainable Architecture - Historic and Community Perspective				✓	✓	
		Climate Change Adaptation and Resilience in Architecture				✓	✓	
		Elective I				✓	✓	
		Elective II				✓		✓
		Sustainable Design Studio	✓			✓	✓	✓
	2	Urban Design: Theory and Practice					✓	
		Process in Design					✓	✓
		Elective III					✓	
		Elective IV					✓	✓
		Urban Environment Design Studio	✓				✓	✓
II	3	Research Methodologies for Human Environment	✓	✓				
		Elective V			✓		✓	✓
		Elective VI			✓			✓
		Pre-Thesis	✓	✓	✓			
		Process Based Design Studio	✓		✓			✓
		Internship Training	✓		✓			
	4	Thesis	✓	✓	✓	✓	✓	✓

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ANNA UNIVERSITY, CHENNAI
UNIVERSITY DEPARTMENTS
M.ARCH (GENERAL)
REGULATIONS - 2019
CHOICE BASED CREDIT SYSTEM
CURRICULUM AND SYLLABUS FOR I TO IV SEMESTERS

SEMESTER I

Sl. No.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	AA5101	Sustainable Architecture - Historic and Community Perspective	PCC	3	0	0	3	3
2.	AA5102	Climate Change Adaptation and Resilience in Architecture	PCC	3	0	0	3	3
3.		Program Elective I	PEC	3	0	0	3	3
4.		Audit Course I*	AC	2	0	0	2	0
THEORY CUM STUDIO								
5.		Program Elective II	PEC	1	0	4	5	3
STUDIO								
6.	AA5111	Sustainable Design Studio	PCC	0	0	16	16	8
TOTAL				**12**	**0**	**20**	**32**	**20**

*Audit Course is Optional

SEMESTER II
(Prerequisite- Pass in Sustainable Design Studio)

Sl. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	AA5201	Urban Design: Theory and Practice	PCC	3	0	0	3	3
2.	AA5202	Process in Design	PCC	3	0	0	3	3
3.		Program Elective III	PEC	3	0	0	3	3
4.		Audit Course II*	AC	2	0	0	2	0
THEORY CUM STUDIO								
5.		Program Elective IV	PEC	2	0	2	4	3
STUDIO								
6.	AA5211	Urban Environment Design Studio	PCC	0	0	16	16	8
TOTAL				**13**	**0**	**18**	**31**	**20**

*Audit Course is Optional

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SEMESTER III
(Prerequisite- Pass in Urban Environment Design Studio)

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	AA5351	Research Methodologies for Human Environment	RMC	3	0	0	3	3
2.		Program Elective V	PEC	3	0	0	3	3
THEORY CUM STUDIO								
3.		Program Elective VI	PEC	2	0	2	4	3
STUDIO								
4.	AA5311	Pre-Thesis	RMC	0	0	6	6	3
5.	AA5312	Process Based Design Studio	PCC	0	0	16	16	8
MANDATORY								
6.	AA5313	*Internship Training	EEC	X	X	X	X	2
TOTAL				**8**	**0**	**24**	**32**	**22**

* 4 weeks in Summer Vacation between II and III Semesters

SEMESTER IV
(Prerequisite -Pass in Process Based Design Studio & Pre-Thesis, 40 Credits)

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
STUDIO								
1.	AA5411	Thesis	EEC	0	0	24	24	12
TOTAL				**0**	**0**	**24**	**24**	**12**

TOTAL CREDITS:74

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PROGRAM CORE COURSES (PCC)

SI. No.	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	AA5101	Sustainable Architecture - Historic and Community Perspective	PCC	3	0	0	3	3
2.	AA5102	Climate Change Adaptation and Resilience in Architecture	PCC	3	0	0	3	3
3.	AA5111	Sustainable Design Studio	PCC	0	0	16	16	8
4.	AA5201	Urban Design: Theory and Practice	PCC	3	0	0	3	3
5.	AA5202	Process in Design	PCC	3	0	0	3	3
6.	AA5211	Urban Environment Design Studio	PCC	0	0	16	16	8
7.	AA5312	Process Based Design Studio	PCC	0	0	16	16	8

PROGRAM ELECTIVE COURSES (PEC)

SI. No.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
ELECTIVE I- THEORY (Sustainability)								
1.	AA5001	Architectural Lighting	PEC	3	0	0	3	3
2.	AA5002	Appropriate Technologies and Sustainable Construction	PEC	3	0	0	3	3
3.	AA5003	Super Tall Buildings	PEC	3	0	0	3	3
4.	AA5004	Sustainable Building Services and Water Management	PEC	3	0	0	3	3
5.	AA5005	Building Skins and Smart Materials	PEC	3	0	0	3	3
ELECTIVE II- THEORY CUM STUDIO (Building Evaluation Skills)								
1.	AA5021	Building Information Modelling	PEC	1	0	4	5	3
2.	AA5022	Performance Evaluation of Buildings	PEC	1	0	4	5	3
3.	AA5023	Life Cycle Assessment of Buildings	PEC	1	0	4	5	3
ELECTIVE III- THEORY (Urban Issues)								
1.	AA5006	Retrofitting and Adaptive Reuse	PEC	3	0	0	3	3
2.	AA5007	Urban Cultural Landscapes	PEC	3	0	0	3	3
3.	AA5008	Urban Conservation and Regeneration	PEC	3	0	0	3	3
4.	AA5009	Emerging Practices in Housing	PEC	3	0	0	3	3

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		ELECTIVE IV- THEORY CUM STUDIO (Urban Analysis)						
1.	AA5024	Urban Infrastructure and Management	PEC	2	0	2	4	3
2.	AA5025	Environmental Impact Assessment	PEC	2	0	2	4	3
		ELECTIVE V – THEORY (Design Theory, Process and Pedagogy)						
1.	AA5010	Facilities Programming and Management for Architecture	PEC	3	0	0	3	3
2.	AA5011	Environmental Psychology	PEC	3	0	0	3	3
3.	AA5012	Psychology of Learning and Development	PEC	3	0	0	3	3
4.	AA5013	Theory of Architecture Education	PEC	3	0	0	3	3
		ELECTIVE VI- THEORY CUM STUDIO (Design and Arts Exploration)						
1.	AA5026	Architectural Journalism and Photography	PEC	2	0	2	4	3
2.	AA5027	Explorations in Architectural Form	PEC	2	0	2	4	3

RESEARCH METHODOLOGY COURSES (RMC)

SI. No.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	AA5351	Research Methodologies for Human Environment	RMC	3	0	0	3	3
2.	AA5311	Pre-Thesis	RMC	0	0	6	6	3

EMPLOYABILITY ENHANCEMENT COURSES (EEC)

SI. No.	COURSE CODE	COURSETITLE	CATE GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	AA5313	*Internship Training	EEC	X	X	X	X	2
2.	AA5411	Thesis	EEC	0	0	24	24	12

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AUDIT COURSES (AC)
Registration for any of these courses is optional to students

Sl. No	COURSE CODE	COURSE TITLE	CATE GORY	PERIODS PER WEEK			CREDITS	SEMES TER
				L	T	P		
1.	AX5091	English for Research Paper Writing	AC	2	0	0	0	
2.	AX5092	Disaster Management	AC	2	0	0	0	
3.	AX5093	Sanskrit for Technical Knowledge	AC	2	0	0	0	
4.	AX5094	Value Education	AC	2	0	0	0	
5.	AX5095	Constitution of India	AC	2	0	0	0	1/2
6.	AX5096	Pedagogy Studies	AC	2	0	0	0	
7.	AX5097	Stress Management by Yoga	AC	2	0	0	0	
8.	AX5098	Personality Development Through Life Enlightenment Skills	AC	2	0	0	0	
9.	AX5099	Unnat Bharat Abhiyan	AC	2	0	0	0	
						Total Credits:	0	

SUMMARY

Sl. No.	Subject Area	Credits per Semester				Credits Total
		I	II	III	IV	
1	PCC	14	14	8	-	36
2	PEC	6	6	6	-	18
3	EEC	-	-	2	12	14
4	RMC	-	-	6	-	6
	Total	**20**	**20**	**22**	**12**	**74**
5	Non-Credit	Audit Course I	Audit Course II			

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AA5101	SUSTAINABLE ARCHITECTURE - HISTORIC AND COMMUNITY PERSPECTIVE	L T P/S C 3 0 0 3

OBJECTIVES

- To give familiarity about the evolution of the idea of sustainability in built environment from the past to the present.
- To inform about sustainable concepts and principles of vernacular and historical architecture.
- To give knowledge about contemporary applications of traditional principles of sustainability.
- To give overview of practices, strategies and implementation processes that shape sustainable architecture.

UNIT I INTRODUCTION TO SUSTAINABILITY 6

Basics of ecology, ecosystems, energy and material cycles in nature. Function of ecosystem. Concept of Sustainability and Sustainable Development. Issues of sustainability in the current world. Difference between Green and Sustainable design. Need, premise and strategies for sustainable and green design. Need for finding holistic solutions.

UNIT II SUSTAINABLEBUILT ENVIRONMENT ACROSS HISTORY 12

Life style of early humans. Evolution of sustainability. Ancient and traditional perspectives in neighbourhood planning and architecture from cultures across the world. Planning principles and concepts of historic and vernacular Indian cities/settlements with respect to sustainability. Cultural beliefs associated with the principles/ concepts.

UNIT III TRADITIONAL ARCHITECTURE AND ITS RESPONSE TO CLIMATE 9

Sustainable architecture in human settlement planning and housing – examples from vernacular and planned cities in different geo-climatic zones. Climatic response of vernacular architecture - analytical studies including developing scientific evidence. Water management in buildings- water saving/ demand management, water harvesting for recharge and use, reuse/ recycling.

UNIT IV SUSTAINABILITY LESSONS FROM TRADITIONAL ARCHITECTURE 9

Scale and context of sustainability, issues and solutions in the current world. Relevance of traditional and vernacular architecture in finding sustainable solutionsto present situations. Importance of application of principles of traditional and vernacular architecture in modern context to achieve sustainability in various aspects- urban built space ratios, urban street canyons, environmental design and cultural identity, etc., Case studies of contemporary examples inspired from the past.

UNIT V STRATEGIES FOR SUSTAINABLE DESIGN 9

Community Participation in developing sustainable designs. Participatory approaches to learning and development. Building and planning requirements. Green Building Evaluation Systems: LEED, GRIHA. Legal instruments/ incentives for sustainable buildings. New concepts and trends in green buildings, national and international.

TOTAL: 45 PERIODS

OUTCOME

- An understanding of relation between sustainability and human history.
- Knowledge about sustainableprinciples in built environments from the past and familiarity with their applications in contemporary situations.
- An understanding of sustainability in a holistic manner, incorporating past knowledge and current developments in the field.

REFERENCES

- Ken Yeang, 'Eco design - A Manual for Ecological Design', Wiley- Academy, Chichester, 2008.
- Sue Roafet all, 'Ecohouse: A Design Guide' Routledge, London, 2013.
- Thomas E Glavinich, 'Contractor's guide to Green Building Construction: Management, project delivery, documentation and risk reduction', Wiley, 2008.

- Daniel Vallero and Chris Brasier; 'Sustainable Design- The science of sustainability and Green Engineering', Wiley, 2008.
- Margaret Robertson, 'Sustainability Principles and Practice', Routledge, Abingdon, 2017.
- Martin A. A. Abraham, 'Sustainability Science and Engineering: Defining Principles', Elsevier Science, 2005.
- Tony Clayton, Nicholas J. Radcliffe, Anthony M. H. Clayton, 'Sustainability: A Systems Approach', Routledge, 2018.
- Stephen M. Wheeler, 'Climate Change and Social Ecology: A New Perspective on the Climate Challenge', Routledge, New York, 2012.
- Gursharan Singh Kainth, 'Climate Change, Sustainable Development and India: Need for new economic thought', LAP Lambert Academic Publishing, 2011.

AA5102 **CLIMATE CHANGE ADAPTATION AND RESILIENCE** **L T P/S C**
          IN ARCHITECTURE   **3 0 0 3**

OBJECTIVES
- To give understanding of the effects of climate change at global and local levels.
- To inform about vulnerability assessment methods.
- To give knowledge about strategies and methods in the design of built environment for adaptation, mitigation and resilience with respect to climate change.
- To give knowledge about government policies with respect to measures regarding climate change.

UNIT I   INTRODUCTION TOCLIMATE CHANGE   6
Climate Change across History. Causes of Climate Change. Anthropogenic drivers of climate change. Global warming, greenhouse effect, carbon stocks and flow, Interaction of these factors at global and Indian scale. Evidences of climate change. Climate change predictions at macro and micro level. Disaster vulnerability of India with emphasis on climate change.

UNIT II   ADAPTATION TO CLIMATE CHANGE/ITS EFFECTS   12
Complexities and uncertainties rising out of climate change in built environment. Climate Adaptation, mitigation and resilience related to climate change. Reactive and proactive measures. Climate adaptation in contemporary architecture. Need for sustainable measures in disaster mitigation. Changes in the ecosystem post disaster. Restoring ecological balance post disaster. Climate adaptation in architecture. Relationship between nature and built form. Response and adaptation of vernacular and traditional architecture to climatic conditions and effects of climate change.

UNIT III   MITIGATION OF CLIMATE CHANGE   9
Vulnerability analysis and assessment. Social Consequences. Climate change mitigation in buildings andurbanism. Mitigation from demand and supply side mitigation. Service Demand Reduction. Carbon Trading. Mitigation strategies - carbon efficiency,reduction of building related emissions.Case Studies. International mechanisms to support climate change mitigation and low carbon development.

UNIT IV   CLIMATE CHANGE AND RESILIENT ARCHITECTURE   12
Architectural responses to impact of climate change. Concept of climate resilience. Components and action for resilient built forms. Planning strategies, methods and tools for resilient architecture at various scales reacting to earthquakes, floods, cyclones, storms, temperature, etc. Resilient back up and power systems. Lighting services during emergency. Resilient HVAC, water, storm water and grey water systems.

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UNIT V LEGAL FRAMEWORKS, CODES AND POLICIES, STRATEGIES   6

Climate change initiatives at international level and participating bodies. Goals, objectives, challenges. IPCC, UNFCCC, Kyoto Protocol, Montreal Protocol and Paris Agreement. Climate change policy framework. India's Response to Climate Change. NAPCC and SAPCC. Green actions of India.

TOTAL: 45 PERIODS

OUTCOME
- An understanding of the impact of climate change and specific vulnerabilities related to it.
- Knowledge about designing built environment with respect to adaptation, mitigation and resilience associated with climate change.
- Familiarity with frameworks for addressing climate change.

REFERENCES
- R.K.Pachauri, 'Dealing with Climate Change: Setting a global agenda for mitigation and adaptation', The Energy and Resources Institute(TERI), 2010.
- Daniel D. Perlmutter, 'The Challenge of Climate change: Which way now?', John Wiley & sons ltd., 2010
- Peter F Smith, 'Architecture in a Climate of Change', Routledge, London, 2016.
- William Gethering, Katie Puckett, 'Design for Climate Change', RIBA, London, 2013.
- David Crichton, Fergus Nicol, Sue Roaf, 'Adapting Buildings and Cities for Climate Change', Taylor and Francis, 2016.
- Madan Kumar Jha, 'Natural and Anthropogenic Disasters: Vulnerability, Preparedness and Mitigation', Springer, 2016.
- George Baird, 'The Architectural Expression of Environmental Control Systems', Taylor & Francis, London, 2004.
- Aravind Krishna, Nick Baker, SimosYannas and Szokolay S V, 'Climate Responsive Architecture: A Design handbook for energy efficientbuildings' McGraw-Hill Education, 2017.
- Brown.G.Z. and Mark Dekay, 'Sun, Wind and Light: Architectural Design Strategies', John Wiley and Sons inc.,2014.
- Tri HarsoKaryono, Robert Vale, Brenda Vale, 'Sustainable Building and Built Environments to Mitigate Climate Change in the Tropics-Conceptual and Practical Approaches', Springer, 2017.
- Colin A. Booth, Felix N. Hammond, David G. Proverbs, Jessica Lamond, 'Solutions for Climate Change Challenges in the Built Environment', John Wiley & Sons, 2011.

AA5111	SUSTAINABLE DESIGN STUDIO	L T P/S C
		0 0 16 8

OBJECTIVES
- To enable the incorporation of sustainability in architectural design at various scales.
- To help balance varied technical and planning considerations in building design with aspects of sustainability.

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

Part I   Study and Overall Design Stage   **160**

In this part, focus would be on studying macro and micro level issues and coming up with design propositions and strategies. This may include policy, master plan, building design as the case may be based on the project.

Part II   Detailed Design Stage   **80**

In this part, the aim is to freeze on the propositions and then develop a part of it to completion in all aspects. The outcome will be a workable solution to a part of a building project if the project is large or the entire building if the project is small. It could range from building envelope design to developing prototypical solutions.

TOTAL : 240 PERIODS

OUTCOME

- An ability to balance human needs with environmental concerns in architectural design.
- Skill in executing a small part of a broader idea into a workable solution.

REFERENCES

- SatyajitGhosh, Abhinav Dhaka, 'Green Structures: Energy Efficient Buildings', 1st Edition, Ane Books, 2016.
- Mary Guzowski, 'Towards Zero Energy Architecture: New Solar Design', Laurence King Publishing, 2012.
- Antony Wood, RubaSalib, Eds, 'Guide To Natural Ventilation in High Rise Office Buildings'1st Edition, Routledge, 2012.
- BjørnBerge,'The Ecology of Building Materials', Architectural Press, 2009.
- Paul Tymkow, SavvasTassou, Maria Kolokotroni, HussamJouhara, 'Building Services Design for Energy Efficient Buildings',1st Edition, Routledge, 2013.
- Ian Ward, 'Energy and Environmental Issues for the Practising Architect', Thomas Telford Publishing, 2004.

AA5201   URBAN DESIGN: THEORY AND PRACTICE   L T P/S C
3 0 0 3

OBJECTIVES

- To introduce the evolution of urbanism and the urban design discipline.
- To introduce tools and techniques used in critical enquiry into urban issues.
- To give understanding of the complex challenges faced by contemporary urbanism.
- To introduce emerging concepts and strategies in urban interventions.

UNIT I   INTRODUCTION   12
Introduction to the origin and evolution of urbanism across the world with key examples. Historic overview of the development of the urban design discipline and principles.

UNIT II   READING THE URBAN ENVIRONMENT   9
Introduction to the different tools and methods to read the urban environment and interpret underlying issues.

UNIT III   CONTEMPORARY ISSUES AND CHALLENGES IN URBANISM   9
Introduction to various contemporary issues that influence urbanism such as globalisation, environmental degradation and pollution, imageability and identity, digital revolution, splintering urbanism, privatization of the public realm, climate change, etc.

UNIT IV   URBAN INTERVENTIONS: CONTEMPORARY PROCESSES   9

Contemporary processes and digital tools in urban design. Place-making in digital age. Participative design and community engagement. Restructuring the urban realm, urban conservation and regeneration policies. Suitable case studies for all the above.

UNIT V   URBAN INTERVENTIONS: EMERGING CONCEPTS AND STRATEGIES   6

Landscape urbanism. Transit-oriented development and walkability. Net-zero Cities. Sustainable cities programme. Resilient cities. Smart Cities. Shareable cities.

TOTAL: 45 PERIODS

OUTCOME
- Awareness of urbanism as a phenomenon.
- An understanding of the complexity involved in addressing contemporary urban issues.
- Knowledge of various contemporary processes and urban interventions.

REFERENCES
- Edmund Bacon, 'Design of Cities', Penguin Books, 1976.
- Kevin Lynch, 'Image of the City', MIT Press, 2017.
- Jonathan Barnett, 'An Introduction to Urban Design', Harper & Row, London, 1996.
- Christian Norberg Schulz, 'Genius Loci: Towards a Phenomenology of Architecture', Rizzoli New York, 1996.
- Cavallo, R. et al, 'New Urban Configurations', IOS Press, 2014.
- Henriette Steiner & Maximilian Sternberg, 'Phenomenologies of the City: Studies in the History and Philosophy of Architecture', Routledge 2015.
- Jan Gehl, 'Life between Buildings- Using Public Space', ArkitektensForleg 1987.
- 'Time Savers Standard for Urban Design', Donald Watson, McGraw Hill, 2005.
- Malcolm Moore & Jon Rowland Eds, 'Urban Design Futures', Routledge, 2006

AA5202	PROCESS IN DESIGN	L T P/S C
		3 0 0 3

OBJECTIVES
- To introduce the history of process in the discipline of design.
- To give familiarity to different processes in design- analytical, social, computational, etc.,
- To provide an overview of various contemporary design processes and its relation to computation.

UNIT I   INTRODUCTION   6

History of design process across time. Types of Design- unselfconscious Design/ self-conscious design, design through craft/ design through craft, etc., Design Methodology movement. Different models of the design process.

UNIT II   ASPECTS OF DIGITAL ARCHITECTURE   9

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. 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

UNIT III   CONTEMPORARY PROCESS   9

Overview of various Contemporary processes to understand existing situations such as mapping, etc., Design process and its relation to computation. Diagrams. Diagrammatic Reasoning. Diagrams and Design Process. Animation and Design. Digital Hybrid Design Protocols. Concept of Emergence. Introduction to Cellular Automata and Architectural applications. Genetic algorithms and Design Computation.

UNIT IV   GEOMETRIES AND SURFACES   9

Fractal Geometry and their properties. Architectural applications. Works of ZviHecker. 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 V   PROCESS AND PEOPLE   12

Overview of different methods related to study and design in the context of people. User behavior studies, post occupancy studies, participatory approach to design, collaborative processes, computational processes related to people.

TOTAL: 45 PERIODS

OUTCOME

- An understanding of the importance of process in design across history
- An understanding of various tools to study the existing and processesto design future desirable situations.

REFERENCES

- Geoffrey Broadbent, 'Design in Architecture - Architecture and the Human Sciences', D.Fulton, 1988.
- Christopher Alexander, 'A Pattern Language', Oxford, 2015.
- Christopher Jones, 'Design Methods', John Wiley and Sons, 1980.
- Peter Eisenmann, 'Diagram Diaries', Thames & Hudson Ltd., October 1999.
- Ben van Berkel and Caroline Bos, 'MOVE', UN Studio, 2008.
- Greg Lynn, 'Architecture Curvilinearity: The Folded, The Pliant and The Supple', Architectural Design 63: Folding Architecture, Academy Editions, London, 1993.
- Greg Lynn, 'Animate Form', American Academic Research, 2018.
- Ali Rahim, 'Contemporary Process in Architecture', John Wiley and Sons, 2000.
- Walter Benjamin, 'Work of Art in the Age of Mechanical Reproduction', Penguin, 2008.
- William J Mitchell, 'The Logic of Architecture: Design, Computation and Cognition', MIT Press, Cambridge, 1998.
- Marcos Novak, 'Invisible Architecture: An Installation for the Greek Pavilion', Venice Biennale, 2000.

AA5211	URBAN ENVIRONMENT DESIGN STUDIO	L T P/S C
		0 0 16 8

OBJECTIVES

- To enable architectural design in the context of the city.

CONTENT

The studio will focus on architecture as being shaped by and shaping the urban context. The process of architectural design would be seen along with the aspects such as nature of cities, urban morphology, history, place, density, society, public realm, economy, climate and microclimate, ecology, legislation, finance. The design projects would become the site for taking positions on specific issues and developing these ideas to completion.

Part I   Study and Overall Design Stage   180

In this part, focus would be on studying issues related to any one or more of the aspects of the content and come up with design propositions and strategies. This may include policy, master plan, building design as the case may be based on the project.

Part II   Detailed Design Stage   60

In this part, the aim is to freeze on the propositions and then develop a part of it to completion in all aspects. The outcome will be a workable solution to any identified aspect of the overall design. It could range from infill design to street character design.

TOTAL : 240 PERIODS

OUTCOME
* An ability to design buildings as positive additions to the city.

REFERENCES
* Jonathan Barnett, 'An Introduction to Urban Design', Harper and Row, 1996.
* Christian Norberg Schulz, 'Genius Loci: Towards a Phenomenology of Architecture', Rizzoli New York, 1996.
* Cavallo, R. et al, 'New Urban Configurations', IOS Press, 2014.
* Henriette Steiner & Maximilian Sternberg, 'Phenomenologies of the City: Studies in the History and Philosophy of Architecture', Routledge 2015.
* Jan Gehl, 'Life between Buildings- Using Public Space', ArkitektensForleg 1987.
* 'Time Savers Standard for Urban Design', Donald Watson, McGraw Hill, 2005.
* Malcolm Moore & Jon Rowland Eds, 'Urban Design Futures', Routledge, 2006

AA5351   RESEARCH METHODOLOGIES FOR HUMAN ENVIRONMENT   L T P/S C
                                                                                       3 0 0 3
OBJECTIVES
* To give introduction to the importance of critical inquiry as a way of gaining knowledge and adding to it through research.
* To give exposure to the various forms of research and research methodologies/ processes.
* To help engage this understanding in the specific field of human environment research.

UNIT I   INTRODUCTION   9
Basic research issues and concepts. Orientation to research process. Types of research: historical, qualitative, co-relational, experimental, simulation and modelling, logical argumentation, case study and mixed methods. Illustration using research samples.

UNIT II   RESEARCH PROCESS   9
Elements of Research process: finding a topic, writing an introduction, stating a purpose of study, identifying key research questions and hypotheses, reviewing literature, using theory, defining, delimiting and stating the significance of the study, advanced methods and procedures for data collection and analysis. Illustration using research samples.

UNIT III   RESEARCHING AND DATA COLLECTION   9
Library and archives. Internet: New information and the role of internet. Finding and evaluating sources. Misuse. Test for reliability. Ethics.

Methods of data collection- Primary sources: observation and recording, interviews structured and unstructured, questionnaire, open ended and close ended questions and the advantages, sampling. Collecting data from secondary sources.

UNIT IV   REPORT WRITING   9
Research writing in general and its components. Developing the outline, referencing, writing the bibliography, presentation, etc.

UNIT V   CASE STUDIES   9
Case studies illustrating how good research can be, from project inception to completion. Review of research publications.

TOTAL: 45 PERIODS

OUTCOME
- Skill to identify, decipher and interpret issues relating to architecture based on research enquiry methods.
- Knowledge of different methods of conducting research and research writing.

REFERENCES
- Linda Groat and David Wang, 'Architectural Research Methods', 2nd edition, John Wiley and Sons Inc, Hoboken, New Jersey, US, 2013.
- Wayne C Booth, Joseph M Williams Gregory G. Colomb, 'The Craft of Research', 3rd Edition, Chicago Guides to Writing, Editing and Publishing, 2008.
- Iain Borden and Katerina Ruedi, 'The Dissertation: An Architecture Student's Handbook', Edition 2, Architectural Press, 2005
- Ranjith Kumar, 'Research Methodology- A Step by Step guide for Beginners', 4th Edition, Sage Publications, 2014.
- John W Creswell, 'Research Design: Qualitative, Quantitative and Mixed Methods Approaches', Sage Publications, 2013.
- JA Smith, P Flowers, M Larkin,'Interpretative Phenomenological Analysis: Theory, Method and Research (English),I Edition, Sage Publications, 2009.

AA5311	PRE-THESIS	L T P/S C
		0 0 6 3

OBJECTIVES
- To promote research in architecture.
- To enable training in collecting, interpreting and concluding with respect to an area of study.
- To enable preparation for Thesis.

CONTENT
The Pre-Thesis proposal in about 1000 words stating the topic/ issues to be explored and the scope must be submitted for approval.The main goal of the Pre-Thesis is to serve as a prelude to the final semester Thesis project. However, it would also serve to concretise notions and ideas with respect to specific areas of interest in architecture through a rigorous process of research.

The process would consist of choosing of an area of interest/challenge, writing out initial thoughts on it, clarifying intents, identifying methodologies to achieve the intents, exploring ways of knowing (reading, first hand studies, experimentation, documentation, measured drawing, interviews, simulation, etc.,), structuring the information, analysing and interpreting it, and finally coming to well-argued conclusions. The progress of work will be reviewed periodically throughout the semester.

The research for Pre-Thesis can be of any nature as it is intended to drive the Thesis project. However, the final submission for Pre-Thesis should document/ collate all the work in the form of a Pre-Thesis report. The report will be presented in the viva-voce exam and defended. The Pre-Thesis report will form the basis to begin the Thesis project.

TOTAL: 90 PERIODS

OUTCOME
- Ability to carry out independent research.
- Ability to study, analyse and conclude on an area of interest.
- Depth of knowledge in a particular area that would give a base to start the Thesis project.

REFERENCES
- Iain Borden and Katerina Ruedi, 'The Dissertation: An Architecture Student's Handbook', edition 2, Architectural Press, 2005
- Ranjith Kumar, 'Research Methodology- A Step by Step Guide for Beginners',4th Edition, Sage Publications, 2014.
- Richard Coyne, 'Interpretation in Architecture: Design as Way of Thinking', Routledge, 2005.
- Stephen Bailey, 'Academic Writing: A Handbook for International Students', Routledge, 2011.

- Adam Sharr, 'Reading Architecture and Culture', Routledge, 2012.
- Vian Ahmed, Alex Opoku, Zeeshan Aziz, 'Research Methodology in the Built Environment', Routledge, 2016.

AA5312	PROCESS BASED DESIGN STUDIO	L T P/S C
		0 0 16 8

OBJECTIVES
- To enable understanding of complex situations through engaging appropriate tools that help analyse different aspects of the situations.
- To help incorporate appropriate processes into design- social, environmental, parametric/ contemporary process, computational process, etc., in order to get a holistic design/ address the most crucial aspects of a given design situation.

CONTENT
The increasing complexity of the world today needs a richer analysis to understand interconnected layers. Also, this complexity is correspondingly reflected in the needs of buildings and the built environment. Appropriate design processes can help in study, analysis and integration of specific inputs and needs into the projects. The studio will focus on engaging processes for study/ analysis and for incorporating complex inputs/ data into design so that architecture can address human needs in a holistic manner. Processes such as diagramming, mapping, participatory approaches, collaboration, statistics, data, etc., would be used to understand situations such as macro environment, socio-cultural aspects, user behaviour, aspects of contemporary life, activity and movement, landform, urban form, etc., as required. The projects could be of macro scale involving large campus/ township oriented architectural projects and/ or architectural design interventions in the urban context. The idea of process in design can be deterministic/ generative/ innovative as appropriate for a particular studio project situation.

Part I   Study and Proposition Stage   120
In this part, focus would be on how to study and analyse/ understand a situation through appropriate processes based on the design project and context given. At the end of this, the nature of the problem and the nature of the solution would be arrived at.

Part II   Design Stage   120
In this part, the aim is to project a solution from the process. The outcome will be a workable, ingenious, innovative solution of any scale based on the project. The emphasis would be on how the design solution is connected to the intent through the process and is generated through the process.

TOTAL: 240 PERIODS

OUTCOME
- Ability to identify, study the effects and connections of complex forces and project a desired scenario for a given situation through appropriate processes and tools.
- Ability to find innovative and workable transformations of the existing from the projections in an organic manner.

REFERENCES
- BrankoKolarevic, 'Architecture in the Digital Age: Design and Manufacturing, Spon Press, 2003.
- AchimMenges, Sean Ahlquist, Eds, 'Computational Design Thinking, AD Reader', John Wiley & Sons, 2011.
- Robert Woodbury, 'Elements of Parametric Design', 1st Edition, Routledge, 2010. *Attested*
- Paul Coates, 'Programming Architecture',1st Edition, Routledge, 2010.

- WassimJabi, Brian Johnson, Robert Woodbury, 'Parametric Design for Architecture', Laurence King Publishing, 2013.
- Katherine Melcher, Barry Stiefel, Kristin Faurest, Eds, 'Community-Built: Art, Construction, Preservation, and Place', 1st Edition, Routledge, 2016.
- NishatAwan, Tatjana Schneider, Jeremy Till, 'Spatial Agency: Other Ways of Doing Architecture', Routledge, 2011.
- Philip Plowright, 'Revealing Architectural Design: Methods, Frameworks and Tools', Routledge, 2014.
- Wendy Gunn, Ton Otto, Rachel Charlotte Smith, 'Design Anthropology: Theory and Practice', Berg, 2013.
- C. Thomas Mitchell, 'Redefining Designing: From Form to Experience', Van Nostrand Reinhold, 1992.

AA5313	INTERNSHIP TRAINING	L T P/S C
		X X X 2

OBJECTIVES

- To help in developing depth of knowledge and inquiry in any one of a chosen area of specialty in architecture.
- To enable interacting with practicing architects, allied professionals, researchers and organisations working in the field of speciality in architecture.

CONTENT

The students will undertake the Internship Training in any organisation engaged in activities relating to a specialised area of architecture for a period of 4 weeks. The Internship Training is expected to make awarehow specific areas in architecture can be pursued to depth in the realm of practice and research. The Internship Training can thus be in any architectural practice/ research organisation/ university, etc., where there are such pursuits. Through the Internship Training, the students could obtain mastery in a specific area of practice or research. The students may also utilise the Internship Training to strengthen their ability to do Thesis in the subsequent semester.

The students are expected to complete the Internship Training in the Summer Vacation between second and third semesters, before the commencement of the third semester, and enroll for the course in the third semester. The students shall submit an Internship Training Report, on or before the last working day of the third semester. The students shall be evaluated on the basis of the Report submitted, through a Viva-Voce Examination, as part of the End Semester Examinations of the third semester.

OUTCOME

- Exposure in and enrichment with respect to specific areas of architecture for pursuing practice or independent research.

AA5411	THESIS	L T P/S C
		0 0 24 12

OBJECTIVES

- To facilitate integration of the knowledge gained in the previous semesters with respect to issues/ tools of architectural design at a more advanced level.
- To enable understanding and identifying of issues appropriate to a particular project or area of architecture through independent thinking and to design in a manner appropriate to the project context.

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CONTENT

- The students will synthesise the areas of knowledge, skills and techniques acquired in the various courses of the previous semesters through a thesis project of their choice. This thesis project would be a design project with a strong research component. The scale of the project could extend from individual site to settlement levels.
- The project would extend the knowledge/ critical position developed in the Pre-Thesis. The initial process of background research on the topic through Pre-Thesis will be taken forward towards a concrete design project. The Thesis session would therefore begin from understanding the project situation. The process would culminate in design interventions at scales appropriate to the topic and the final project would manifest the study/ research component. The project shall desirably have the potential to serve as a starting point for practice and/ or further research.
- The progress of work will be reviewed periodically throughout the semester. At the end of the semester, students should submit the final thesis project for the viva voce exam. The final submission will comprise of study sheets, optional study models, design approach sheets, optional design process models, design presentation sheets, final model, detailed drawings based on the research component, project report summarising the entire thesis work and soft copy of all the work.

TOTAL: 360 PERIODS

OUTCOME

- Ability to identify important, specific and unique aspects as informing the process of architectural design.
- Ability to study these aspects in depth and integrate them through methodologies/ techniques/ skills into the design project.

REFERENCES

- Linda Grant and David Wang, 'Architectural Research Methods', John Wiley and Sons, 2013.
- Igor Marjanovi , Katerina Rüedi Ray, Lesley NaaNorleLokko, 'The Portfolio - An Architecture Student's Handbook', Routledge, 2015.

ELECTIVE I

AA5001   **ARCHITECTURAL LIGHTING**   **L T P/S C**
                                                                          3 0 0 3

OBJECTIVES

- To inform about daylight and its use in buildings.
- To give knowledge about electric lighting in interiors and urban lighting.
- To give exposure to lighting research.

UNIT I   DAYLIGHT   7

Daylight – properties and qualities. Effects of daylight on users and subjective impressions. Means of daylight in built environment. Types of Fenestrations. Issues in integrating daylight in low rise and high rise buildings. Principles of lighting design. Lighting concepts. Case studies from architects' and lighting designers' works. Examples – Louis Kahn, Philip Johnson, Mies van der Rohe, Richard Kelly, Tadao Ando, Sir Norman Foster.

UNIT II   DAYLIGHT INTEGRATION IN BUILDINGS   11

Exercises on optimisation of fenestration. Daylight design of a space or a building. Varied climatic context. Physical models / software. Conformity to Byelaws, standards.

UNIT III   ELECTRIC LIGHTING IN INTERIORS   11

Sources of electric lighting. Luminaires- types and applications, design and optimisation. Energy efficient strategies. Integration of daylight and electric lighting using physical models / software.

UNIT IV   URBAN LIGHTING   7

Elements of urban lighting. Street lighting, city lighting. Lighting the building exteriors: concepts, decorative and accent, etc. Issues in urban lighting – energy, light pollution, safety and security.

UNIT V   LIGHTING RESEARCH   9

Introduction to lighting research, need and issues. Types of lighting research – qualitative, quantitative, empirical, case study methods. Review of research papers on lighting.

TOTAL: 45 PERIODS

OUTCOME

- Knowledge about lighting in buildings and urban spaces.
- Awareness of different types of lighting research.

REFERENCES

- Sandy Isenstadt, Margaret Maile Petty, Dietrich Neumann, 'Cities of Light: Two Centuries of Urban Illumination', 1st Edition, Routledge, New York, 2014.
- Schulte-Römer, Nona, Dannemann, Etta and Meier, Josiane, 'Light Pollution – A Global Discussion', Leipzig: Helmholtz Centre for Environmental Research GmbH – UFZ, 2018.
- Emily Dufner, VasilikiMalakasi, Simone Collon, Dan Lister, 'Lighting in The Urban Age: Meaningful Design For Cities, People & Places', ARUP.
- Zumbotel, 'The Lighting Handbook', 6th Edition, 2018.
- 5. Megan Charnley, Tom Jarvis, 'In the Shade: Lighting Local Urban Communities', Research Project, Royal College of Art, London, 2012.
- Bureau of Street Lighting, 'Design Standards and Guidelines', Department of Public Works, Los Angeles, 2007.
- Casper Laing Ebbensgaard, 'Rethinking Urban Lighting: Geographies of Artificial Lighting in Everyday Life', PhD Thesis, 2016.
- Stephen Atkins, Sohail Husain and Angele Storey, 'The Influence of Street Lighting on Crime and Fear of Crime', Crime Prevention Unit Paper No. 28, London, 1991.
- SP 72: National Lighting Code 2010, Bureau of Indian Standards.

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AA5002   **APPROPRIATE TECHNOLOGIES AND SUSTAINABLE**   **L T P/S C**
               CONSTRUCTION   **3 0 0 3**

OBJECTIVES
- To give knowledge and skills to enable the facilitation and transformation of places and spaces where culture and technology are in a state of rapid change and resources are scarce.
- To give familiarity with self-help techniques of construction, adaptation, repair and management in order to give understanding about what is involved in sustainable construction of domestic and community architecture.

UNIT I   INTRODUCTION   7
Architecture and the survival of the planet. Assessing patterns of consumption and their alternatives. Profit and politics. Natural building movement. New context for codes and regulations

UNIT II   DESIGN PRINCIPLES   11
Principle 1: Conserving energy; Principle 2: Working with Climate; Principle 3: minimising new resources; Principle 4: respect for users; Principle 5: respect for site; Principle 6: Holism. Illustrated with examples.

UNIT III   SUSTAINABLE CONSTRUCTION   7
Design issues relating to sustainable development including site and ecology, community and culture, health, materials, energy, and water. Domestic and Community buildings using self help techniques of construction. Adaptation, repair and management.

UNIT IV   SYSTEMS, MATERIALS AND APPLICATIONS   11
Adobe, Cob, Rammed Earth, Modular contained earth, light clay, Straw bale, bamboo, earthen finishes. Sustainability. Adaptability to climate. Engineering considerations and construction methods. Waste as a resource. Portable architecture.

UNIT V   BEST CURRENT PRACTICE   9
Case studies demonstrating best current practice in a scale ranging from small dwellings to large commercial buildings drawn from across the world.

TOTAL: 45 PERIODS

OUTCOME
- An understanding on the needs of alternative technologies in buildings.
- Exposure to sustainable materials and construction.

REFERENCES
- Brenda and Robert Vale, 'Green Architecture: Design for a sustainable future', Thames and Hudson, 1996
- Lynne Elizabeth and Cassandra Adams, 'Alternative Construction: Contemporary Natural Building Methods', Wiley; 1 edition, 2005
- Victor Papanek, 'The Green Imperative', Thames and Hudson, 1995
- Steven Harris and Deborah Berke, 'Architecture of the Everyday', Princeton Architectural Press, 1998
- PilarEchavarria, 'Portable Architecture- and unpredictable surroundings', Page One Publishing Pvt. Ltd., 2005

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SUPER TALL BUILDINGS **L T P/S C**
3 0 0 3

OBJECTIVES
- To give familiarity about skyscrapers/ super tall buildings as a typology in history
- To give information on the Super Tall building typology with respect to structural systems.
- To give understanding about how services integration in super tall structures can translate into an intelligent and energy efficient system which will enable sustainability of the structure.

UNIT I   INTRODUCTION TO SUPER TALL BUILDINGS 7

The history and evolution of skyscrapers and the ideas and theories behind their designs. The rise of skyscraper culture. The architectural and tectonic issues that have accompanied their iconic power. The ways in which changing ideas in design demonstrated and expressed in the skyscraper. Urban environment and physical planning considerations in high rise buildings. Indian standards and global standards for high-rise Buildings.

UNIT II   BUILDING STRUCTURAL SYSTEMS 9

Conceptual understanding of high-rise buildings in normal and adverse conditions. Planning and design considerations of foundation and superstructure for tall and super tall buildings. Construction details understanding. The deck, shear wall, typical framing, floor plate, assembly, building module, components, core wall, structural steel external frame. Sequence of erection and facilitating maintenance of such structures. Identifying specialised equipment required for installation. Suitable case studies.

UNIT III   BUILDING SERVICES 13

Architectural design considerations. Space planning for different types of building services in high-rise buildings. Natural and mechanical ventilation systems. Load estimation. Planning and design for efficiency. Natural lighting systems. Glass and glazing systems for natural lighting. Glass replacement. Shading device. Planning and design of water supply and waste water collection systems. Water storage and distribution systems. Selection of pumps. Rain water harvesting. Sewage collection systems and recycling of water. Solid waste disposal. Planning and design for energy efficiency. Automation and energy management- concepts. NBC's recommendations.

UNIT IV VERTICAL TRANSPORTATION AND SERVICE 7

Vertical transportation systems: Bye- laws and codes in high rise buildings.Types of elevators, systems and services. Lobby design. Escalators- safety principles, latest trends. NBC's recommendations – performance, elevator report, size, car operations, finishes, emergency access. Service car- type, size, hoist way. Loading dock, operational access, hoist complex.

UNIT V   LIFE SAFETY AND CORE ELEMENTS 9

Building code fundamentals. Fire Resisting treatment to steel in composite/structural steel buildings. Stair pressurization. Smoke control. Fighting fire. Fire safety Issues in high-rise Buildings. Escape routes - design and specification. Domestic and fire reserve tank. Emergency generator. Lobby system distribution, sequencing and finishes. Security. Protection from elements such as lighting and aviation. Case studies of high-rise buildings and skyscrapers through appropriate examples.

TOTAL: 45 PERIODS

OUTCOME
- An understanding of skyscrapers as building typology - urban player, cultural artefacts, historical background of vertical urbanism.
- Knowledge about the structural systems and services of super tall buildings.

REFERENCES
- Mario Salvadori ,'Why Buildings Stand Up: The Strength of Architecture', Norton, 2002.
- Guy Nordenson and Terence Riley,'Tall Buildings', MOMA, 2003.
- John Zils and John Viise, 'An Introduction to High-Rise Design', Structure Magazine, November 2003.
- Mark Sarkisian, 'Designing Tall Buildings: Structure as Architecture', Routledge, 2016.

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- Thomas A. P. Van Leeuwen, 'The Skyward Trend of Thought: The Metaphysics of the American Skyscraper, MIT,1988.
- Carol Willis ,'Form Follows Finance: Skyscrapers and Skylines in New York and Chicago', edition 1,Princeton, 1995.
- Sarah Bradford Landau and Carl W. Condit,'Rise of the New York Skyscraper: 1865-1913', Yale, 1996.
- John Zukowsky and Martha Thorne, 'Skyscrapers: The New Millennium', Prestel Pub, 2000.
- Ken Yeang ,'Eco Skyscrapers', Images Publishing, 2007.
- K. Kayvani ,'Design of High-Rise Buildings: Past, Present, and Future', Southern Cross University, ePublication,2014.

AA5004   SUSTAINABLE BUILDING SERVICES AND WATER MANAGEMENT   L T P/S C
                                                                    3 0 0 3

OBJECTIVES
- To give knowledge about the importance of water management systems for optimal use and sustainability and give knowledge about the same.
- To give knowledge about designing and managing building services for sustainability.
- To give familiarity about laws and methods that help in the management of resources in a sustainable manner.

UNIT I   TRADITIONAL WATER MANAGEMENT SYSTEMS   9
Sources of water. Settlements influenced by water bodies. Traditional water management systems in India and other countries. Examples from history. Issues in current context.

UNIT II   WATER MANAGEMENT SYSTEMS   9
Storm water management. Rain water harvesting methods. Calculation of rain water harvesting potential - low rise to urban scale. Issues in water management in Tamil Nadu. Innovative concepts and methods. Case studies. Proposals.

UNIT III   POLICIES AND BYELAWS   9
Right to water. Standards, byelaws and Policies. Access to good quality water. Distribution systems. Water efficient strategies in buildings. Sustainable practices. Waste management and disposal systems. Literature review of water management research papers.

UNIT IV   CARBON NEUTRALITY   9
Low carbon, zero carbon design principles. Passive and active strategies in Building services. Choice of electrical, HVAC equipment. Energy efficient techniques. Renewable energy integration.

UNIT V   CASE STUDIES   9
Online case studies / Visit to high rise buildings. Building services studies – location, optimisation, conformity to LEED India. Green rated buildings – Issues and proposals.

TOTAL: 45 PERIODS

OUTCOME
- Ability to manage water resources for a building in an optimal and sustainable manner.
- Familiarity with different methods to design and manage building services for sustainability.
- Knowledge about laws and strategies with respect to sustainable building services and resources.

REFERENCES
- BIS, 'National Building Code 2005', New Delhi, 2005.
- Fred Hall and Roger Greeno, 'Building Services Handbook', Routledge, 7th edition, 2013.
- 'Manual on Water Supply and Treatment', CPHEEO, Govt. of India, New Delhi, 2003.
- AbiudKaswamila, 'Sustainable Natural Resource Management', CBS Publishers Pvt Ltd, India, 2012.

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- John Briscoe, R.P.S. Malik (Ed.), 'Handbook of Water Resources in India: Development, Management, and Strategies', Oxford University Press, 2007.
- Manual on "Sewerage and Sewage Treatment Systems Part A, Part B &Part C" CPHEEO, Ministry of Urban Development, Government of India, New Delhi, 2013.
- Ramaswamy R. Iyer, 'Water and the Laws in India', Sage Publications India Pvt. Ltd, 2009.
- Rangwala, 'Water Supply and Sanitary Engineering (Environmental Engineering)', Charotar, 2016.
- 'Plumbing Services and Design Guide',Compiled and Published by Institute of Plumbing.
- F Hall, 'Building Services and Equipment (Part I & Part II)', Routledge, 2016.
- K. Nageswara (Ed.), 'Water Resources Management: Realities and Challenges', Eastern Book Corpn., 2006.
- R.N. Athavale, 'Water Harvesting and Sustainable Supply In India', Rawat Publications, 2003.
- William McDonough, Michael Braungart, 'Cradle to Cradle: Remaking the way we make things', North Point Press, 2002.
- 'ISO 14067 - CARBON FOOTPRINT- 'Environmental management -- Life Cycle Assessment - Principles and Framework', International Organization for Standardization.
- 'Sustainable Building Design Manual-Volume I and II',TERI Publication.
- Rakesh Kumar and R N Singh, edited by T.V. Ramchandra, 'Municipal Water and Waste Water Treatment', TERI, 2009.

AA5005	BUILDING SKINS AND SMART MATERIALS	L T P/S C
		3 0 0 3

OBJECTIVES
- To introduce smart materials for use in architectural design.
- To give familiarity about products that have changeable properties in response to elements.
- To inform about materials and technologies such as LEDs, smart glazing, displays, etc.
- To give introduction to building skins in terms of their performance and functionality, bio inspired facades and interactive surfaces.
- To give familiarity about the methods of fabrication, production and construction for innovation in design.

UNIT I   INTRODUCTION   7
Introduction. Innovative Materials. Smart materials in Nature. Current Trends and Developments.

UNIT II   NEW AGE MATERIALS I   9
Property Changing Smart Materials. Photochromics, Thermochromics. Electrochromics. Photoadhesives. Electroactive Polymers. Shape Memory Alloys. Energy-exchanging smart materials. Phase change Materials (PCM).

UNIT III   NEW AGE MATERIALS II   10
Plastic as a structural material, load bearing plastic spandrel panels, fiberglass plastic application in construction.Matter-exchanging smart materials. Gas/Water storing Smart Materials. Absorbent/Super absorbent Polymers. Bioplastics.

UNIT IV   SUSTAINABLE BUILDING SKIN   10
Parameters for designing a sustainable building skin - sun control, natural ventilation, daylighting, connection to outdoors, thermal insulation, moisture control, micro-climate zones, structural efficiency, material choices, potential for energy generation, bio inspired facades, responsive façade, interactive façade.

UNIT V   CASE STUDIES   9
Case studies on the innovative applications of smart materials and various building skins in design.

TOTAL: 45 PERIODS

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OUTCOME

- Knowledge about fundamentals of material and current innovations.
- Ability to explore the potential of smart materials in creative designing.
- Knowledge about smart material characteristics and methods of material technology that can be translated to innovative approaches to design.
- Ability to examine building skin as both giver of character and as part of the performative technology of buildings.

REFERENCES

- Michelle Addington and Daniel L.Schodek, 'Smart Materials and Technologies in Architecture', Architectural Press, Elsevier, 2004.
- Axel Ritter,'Smart Materials: In Architecture, Interior Architecture and Design',Birkhauser, 2007.
- Marinella Ferrara and Murat Bengisu, 'Materials that Change Color: Smart Materials, Intelligent Design', Springer, 2013.
- Elena Gorb, Yves.J.M.Brechet et al, 'Materials Design Inspired by Nature: Function Through Inner Architecture (RSC Smart Materials)', RSC Publishing, 2013.
- P. Gruber and S. Gosztonyi, 'Skin in architecture: towards bioinspired facades', https://www.witpress.com/Secure/elibrary/papers/DN10/DN10045FU1.pdf
- Yeang, K., 'The Green Skykscraper, The Basis for Designing Sustainable Intensive Buildings', Prestel Verlag, Munich, London, New York, 1999.
- Maggie McIntosh, 'Sustainable Building Skin Design' https://soa.utexas.edu/sites/default/disk/technologies/technologies/09_03_fa_speck_mcintosh_ml.pdf

ELECTIVE II

AA5021 **BUILDING INFORMATION MODELLING** **L T P/S C**
1 0 4 3

OBJECTIVE

- To equip students with skills and information to build comprehensive Building Information Models (BIM) using appropriate Digital software and Media.

UNIT I BIM FUNDAMENTALS AND MODELLING 25

Key concepts of BIM. Reading and manipulating the software Interface. Navigating within views. Selection methods. The importance of levels and grids. Creating walls, doors, windows and components. Working with essential modification commands and load family. Creating floors, ceilings, and stairs. Working with type and instance parameters. Importing CAD drawings. Understanding the project browser and type properties palettes. Adding sheets. Inserting views onto sheets. Adding dimensions and text to the mode and plotting.

Creating curtain walls, schedules, details, a custom family, and family types. "flex" a family with family types and work with reference planes. Creating rooms and an area plan. Tagging components. Customising existing wall styles. Creating and edit a topo surface. Adding site and parking components. Drawing label contours. Working with phasing. Understanding groups and links. Working with stacked walls. Learning the basics of rendering and creating a project template.

UNIT II RENDERING AND MATERIAL APPLICATION 15

Choosing material for buildings.Creating custom walls, floors, and roofs.Keynoting.Working with mass elements. Enhancing rendering with lighting. Producing customised materials. Using sun and shadow settings. Walkthrough technique. Adding decals. Working with design options and worksetsCalculating energy analysis. Managing revisions

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UNIT III   BIM FOR BUILDING ENERGY SIMULATION   20

Energy simulation for conceptual BIM models using massing. Detailed modelling using design elements- Rapid energy modelling and simulation with Autodesk® Revit®. Conceptual Energy Analysis features to simulate performance from within Revit Architecture. Use Autodesk® Green Building Studio® to produce energy consumption, carbon neutrality and renewable potential reports.

UNIT IV   BUILDING AUTOMATION AND NETWORKING   15

Introduction to building automation systems. Components of BAS. HVAC, lighting, electrical systems, water supply and sanitary systems, fire safety, security, communication and office automation system. Concept of Intelligent buildings. Integration of services. Water pump monitoring and control. Control of Computerised HVAC Systems. Direct Digital Control. Chillers, pumps, BTU monitoring and control. Data networking. IBMS system and its components. Centralised control equipment. Substation and field controllers. Field sensors.

TOTAL: 75 PERIODS

OUTCOME

- Knowledge about the implementation of BIM concepts throughout the lifecycle of a building, from planning and design, to construction and operations.
- Familiarity with the use of BIM for building energy performance simulation, construction administration.

REFERENCES

- Eastman.C, Teicholz.P, Sacks.R, Liston.K, 'BIM Handbook: A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors', Wiley, New York, 2011.
- Ray Crotty, 'The Impact of Building Information Modelling: Transforming Construction', Routledge, 2011.
- Malcolm McCullough, William J. Mitchell, Patrick Purcell, 'The Electronic Design Studio, Architectural Knowledge and Media in the Computer Era', MIT Press, 1990.
- Omura, George, Brian C Benton, 'Mastering AutoCAD', Autodesk.
- Elliot, Steven, Miller, Philip and Pyros, Gregory, "Inside 3D Studio - Release 3", New Readers Publications, Indianapolis.

AA5022   PERFORMANCE EVALUATION OF BUILDINGS   L T P/S C
      1 0 4 3

OBJECTIVES

- To facilitate simulation and auditing techniques for assessing energy performance, environmental response and impact of built form.
- To give knowledge about solar shadow modeling tools, heat flow analysis, light simulation tools, modelling of ventilation, fire dynamics, sizing of passive solar features, estimation of energy conservation.

UNIT I   ENERGY AND THE PERFORMANCE OF BUILDING   15

Need for performance analysis of buildings - Investigation and assessment, energy audit procedures - Design investigations - Basics of thermal comfort, solar shading/access/ control, day lighting, acoustics air movement etc.- Energy conservation measure calculations - Modelling systems: cognitive, empirical and analytical assessment of buildings - Architectural Computation and performance audit. Introduction to ECOTECT.

UNIT II   MODELLING OF THE BUILDING FORM   25

Modelling the Building form - Parametric and empirical building simulation - Factors affecting accuracy of energy model - Thermal performance criteria of buildings - Envelope considerations, climatic analysis, weather data-Heating and cooling systems modelling, ventilation systems modelling - Energy use analysis through open source software such as EQUEST. Integration of ECOTECT with BIM, RAPID ENERGY MODELLING -Modelling and performance simulation of

existing buildings – eQuest and Sketch Up + Open Studio + Energy Plus or any free wares which are approved by Department of Energy, USA / India as simulation software Design builder, IES VE, TRNSYS etc.

Simple exercises in the above.

UNIT III   POST OCCUPANCY EVALUATION OF BUILDINGS   15

Purpose and components of Post occupancy evaluation (POE), Building performance bench marks, Occupant satisfaction, Indoor air quality, PPD and PMV analysis, Techniques and methods for post occupancy evaluation, assessing existing buildings based on their energy and water usage.

Case Studies and exercises in the above.

UNIT IV   SEMINAR AND CASE STUDY PRESENTATION   20

Case study presentation of students on performance evaluation of a small residential / office typology in different climate zones- on how to integrate passive design and show results of how energy efficiency has been achieved - Real time data collection using physical instruments and paper publication to journals.

TOTAL: 75 PERIODS

OUTCOME

- Knowledge about environmental assessment methods, audit and simulation techniques, energy modelling skills.
- Ability to add value to architectural design processes.

REFERENCE

- 'Teaming for Efficiency: Technologies, Design, Performance Analysis and Building Industry Trends', American Council for an Energy-Efficient Economy, 2002.
- James P. Waltz, 'Computerized Building Energy Simulation Handbook', Fairmont PR, 1999.
- Joseph Clarke, 'Energy Simulation in Building Design', Routledge, 2007.
- GiulianoDall'O', 'Green Energy Audit of Buildings: A Guide for a Sustainable Energy Audit of Buildings', Springer, 2013.
- ASHRAE Press, 'The ASHRAE Green Guide', Butterworth- Heinemann, 2006.
- Energy Conservation Building Code of India - User manual, 2017.
- MoncefKrarti, 'Energy Audit of Building Systems', CRC Press, 2010.
- Clarke.J.A., 'Energy Simulation in Building Design', CRC Press, 1985.
- ESRU, 'The ESP-r System for Building Energy Simulation User Guide Version 10 Series', University of Strathclyde, 2002.
- Kabele.K, 'Modelling and Analyses of Passive Solar Systems with Computer Simulation', in Proc. Renewable Energy Sources, PP. 39 – 44, Czech Society for Energetics Kromeriz, 1998 (in Czech)

PROGRESS THROUGH KNOWLEDGE

AA5023	LIFE CYCLE ASSESSMENT OF BUILDINGS	L T P/S C
		1 0 4 3

OBJECTIVES

- To introduce fundamental concepts related to life cycle assessment of buildings
- To give knowledge about systems-based approaches required to create sustainable solutions for society.

UNIT I   EMBODIED ENERGY AND CRADLE TO CRADLE   25

Introduction, Material flow and waste management - An Introduction to Sustainability Concepts and Life Cycle Analysis (Introduction, Material flow and waste management - Risk and Life Cycle Framework for Sustainability (Introduction, Risk, Environmental Risk Assessment, Example Chemicals and Health Effects, Character of Environmental Problems) - inventory data - characterization factor **-** Global impact - Regional impacts - Local impacts.

Development of the concept, factors to be considered, calculation techniques for embodied energy - Data sets available for calculation of embodied energy - Case studies of embodied energy calculations - Sample embodied energy calculations for a material - Concept of embodied carbon or carbon footprint of material, calculation techniques, methods to off-set high embodied energy - Cradle to cradle material, whole life cycle and life cycle costing analysis techniques.

Simple exercises in the above.

UNIT II   LCA METHODS AND TOOLS   20

Product development and improvement using - Environmental Data Collection Issues, Statistical Analysis of Environmental Data, Common Analytical Instruments. Databases for LCA- Commercial databases -U.S. Life Cycle Inventory Database (USLCI) - CPM LCA Database - European Life Cycle Database (ELCD)- LCA modeling tools- Construction industry based: AIST-LCA Ver.4 , BEES 4.0, Eco-Bat 2.1, Environmental Impact Estimator V3.0.2 , LEGEP 1.2 , LTE OGIP; Version 5.0; , SimaPro 7 - Waste management based: WRATE, USES-LCA, GEMIS version 4.4, Ecoinvent waste disposal inventory tools v1.0.

Simple exercises in the above.

UNIT III   IMPACT ASSESSMENT   15

Life Cycle Assessment. Detailed Methodology and ISO Framework. Detailed Example on LCA Comparisons. LCA Benefits and Drawbacks. Historical Development and LCA Steps from ISO Framework. Life Cycle Inventory and Impact Assessments (Unit Processes and System Boundary, Data Quality, Procedure for Life Cycle Impact Assessment, LCIA in Practice with examples, Interpretation of LCIA Results).

Exercises in the above.

UNIT IV   INTERPRETATION   15

Interpretation. Evaluating data. Comparisons of data. Decision making interpretation and conclusion. Recommendations. The application of life cycle assessment methodology using appropriate case studies.

TOTAL: 75 PERIODS

OUTCOME
- An understanding of the concepts and the scientific method as it applies to a systems-based, trans-disciplinary approach to sustainability,
- Ability to identify problems in sustainability and formulate appropriate solutions based on scientific research, applied science, social and economic issues.
- An understanding of the basic concepts of life cycle assessment (LCA), along with life cycle inventory (LCI) and life cycle impact assessment (LCIA) including the social and economic dimensions.

REFERENCES
- Marry Ann Curan, 'Environmental Life Cycle Assessment', McGraw Hill, New York, 1996.
- International Organization for Standardization: ISO 14040 Series of Standards for Life Cycle Analysis, 2006.
- Wimmer W, Zust R, Lee K, 'Eco Design Implementation: A Systematic Guidance to Integrating Environmental Considerations into Product Development', Springer, 2004.
- International Organization for Standardization: ISO TR 14062 Environmental Management - Integrating Environmental Aspects into Product Design and Development, 2002.
- David F Ciambrone, 'Environmental Life Cycle Analysis', CRC Press LLC, 1997.
- UNEP/SETAC Life Cycle Initiative, Website: http://www.uneptie.org/sustain/initiative, 2004.

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AA5006	RETROFITTING AND ADAPTIVE REUSE	L T P/S C
		3 0 0 3

OBJECTIVES

- To introduce the importance of traditional architectural knowledge system for conservation.
- To emphasise need for sustainability of the existing morphology through adaptive reuse in order to provide alternative options in urban renewal with reference to changing market dynamics.
- To enable a better understanding of the structure and fabric of historic structures.

UNIT I   TRADITIONAL KNOWLEDGE SYSTEM   7

Traditional Architecture and its associative crafts. Historic City- a product of people, place and time. Architectural Knowledge System as a tool for Conservation.

UNIT I   STRUCTURAL SYSTEMS   9

Introduction to construction techniques and structural components in a historic structure. Understanding various types of historic structural systems. Structural analysis of historic structures. Understanding various techniques for structural analysis. Understanding the failure and distress in historic structures and development of new forms. Inspection and diagnosis of structures.

UNIT III   THEORY OF MATERIALS   10

Characterisation of materials and compatibility of its usage. Relationship between various historic building materials and historic buildings. Maintenance requirements of building materials. Diagnosis and assessment of defects in building materials by atmospheric elements. Remedial measures. Strengthening of building materials.

UNIT IV   RETROFITTING OF BUILDINGS / PROPERTIES AND ADAPTIVE REUSE   10

Urban Renewal – Rehabilitation, Redevelopment and Conservation. Adaptive Re-use, retrofitting, facadism, commodification. Methods and mechanisms.

UNIT V   CASE STUDIES   9

Legal framework and administrative aspects, policies and charters. Case studies of proposals for conservation / adaptive reuse from India and abroad. Sustainable development, Brownfield projects, mixed use strategies (examples in Indian and Western context).

TOTAL: 45 PERIODS

OUTCOME

- Sensitivity with respect to the significance of adaptive reuse and retrofitting with its implications in creating value.

REFERENCES

- Cliff Moughtin, 'Urban Design-Street and Square', Routledge, 2007
- Edmund Bacon, 'Design of Cities', Revised edition, Penguin, USA, 1976
- Geoffrey Broadbent, 'Emerging concepts in Urban Space Design', Taylor & Francis, 1995
- Jon Lang, 'Urban Design- A Typology of Procedures and Products', Routledge, 2017.
- Wright.A, 'Craft Techniques for Traditional Buildings', BT Batsford Ltd, 1991.
- Allen G. Noble , 'Traditional Building: A Global Survey of Structural Forms and Cultural Functions', I. B. Tauris, 2007.
- Kingston Wm Heath, 'Vernacular Architecture and Regional Design: Cultural Process and Environmental Response', Architectural Press, 2009.

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AA5007   **URBAN CULTURAL LANDSCAPES**   **L T P/S C**
                                                                              3 0 0 3

OBJECTIVES

- To give understanding of social and cultural diversity as design generators.
- To introduce tools for documentation and analysis of urban cultural landscapes.
- To introduce the various theories and discourses on urban cultural landscape.
- To give understanding of the complex challenges involved in the practice of conservation of urban cultural landscapes through national and international case studies.

UNIT I   DEFINING URBAN CULTURAL LANDSCAPES   9
Introduction to the concept of Urban Cultural Landscape as the result of interplay between natural and built environment and as the generator of Spirit of place - uniqueness of place, peoples and traditions.

Definition of Urban Cultural Landscapes and Historic Urban Landscape as understood in the international framework (Vienna Memorandum, World Heritage Cities Programme, ICOMOS)

UNIT II   TOOLS AND METHODS FOR MAPPING CULTURAL LANDSCAPES   9
Tools and methods to delineate, document and analyze the complexity of the urban cultural landscape; Mapping tangible and intangible values (recording oral history and traditional knowledge systems)

UNIT III   URBAN CULTURAL LANDSCAPE: THEORIES AND DISCOURSE   9
Introduction to the evolution of theories and discourse on urban cultural landscape.
Inclusion of traditional and indigenous cultural values, emphasis on local and lived experience, collective memory, identity, meaning and association, local and traditional knowledge systems, sacred landscape.

UNIT IV   URBAN CULTURAL LANDSCAPES: PRACTICE AND CHALLENGES   9
Challenges in managing urban continuity and change: global processes, urbanization and development, economics, changing cities, tourism. Shift from object or monument-centric approach to the notion of 'value' guided by urban values and the economic value of conservation. Shift from expert oriented approach to inter-disciplinary and community-based or people-centric approaches.

UNIT V   CASE STUDIES   9
National and International case studies to understand the application of theoretical frameworks and trace the relation between discourse and practice of conservation of urban cultural landscapes

                                                                    TOTAL: 45 PERIODS
OUTCOME
- Ability to identify and appreciate the importance of social and cultural diversity.
- Ability to document urban cultural landscapes.
- Sensitivity to complex challenges involved in urban conservation.
REFERENCES
- Rana P.B. Singh, 'Heritagescapes and Cultural Landscapes', Shubhi Publications, 2011.
- Mauro Agnoletti, 'Conservation of Cultural Landscapes', CABI, 2006.

AA5008   **URBAN CONSERVATION AND REGENERATION**   **L T P/S C**
                                                                            3 0 0 3
OBJECTIVES
- To introduce the idea of conservation as enhancing quality of life, as effective planning strategy, as means of particularization of place and as a way to address issues of memory and identity.
- To give an overview of current status of conservation in India and introduce issues and practices of urban conservation at various levels and scales.
- To equip students to deal with urban conservation and recycling along with related design issues of existing urban environment, old cities natural and urban heritage areas

UNIT I   INTRODUCTION TO CONSERVATION   9

Understanding Heritage. Types of Heritage. Heritage conservation: Need, Debate and purpose. Defining Conservation, Preservation and Adaptive reuse. Distinction between Architectural and Urban Conservation. International agencies like ICCROM, UNESCO AND their role in Conservation. The role of Archaeological Survey of India. Role of INTACH inventories and projects.

UNIT II   CONSERVATION PRACTICE   9

Listing of monuments. Documentation of historic structures. Assessing architectural character. Historic report. Guidelines for preservation, rehabilitation and adaptive re-use of historic structures. Seismic retrofit and disabled access/services additions to historic buildings. Heritage site management.

UNIT III   URBAN CONSERVATION AND PLANNING   9

Over view of urban history of India and Tamil Nadu. Understanding the character and issues of historic cities. Select case studies of sites like Thanjavur, Kumbakonam, Kanchipuram, Chettinad. Historic districts and heritage precincts. Norms for conservation of heritage buildings and sites as part of Development Regulations. Central and state government policies and legislations. Conservation as a planning tool. Financial incentives and planning tools such as TDR (transferable development right). Urban conservation and heritage tourism.

UNIT IV   HISTORIC OVERVIEW OF REGENERATION OF CITIES   12

Conservation Area practice. Adaptive reuse. Upgradation. Programmes in old areas. Infill design. Financial and Implementation framework for urban conservation and Adaptive Reuse Projects. Urban recycling and brown field projects. Urban renewal and development strategies for regeneration of inner cities areas. Legislation frameworks and institutional framework for special areas. Urban conservation and urban recycling. Recent successful practices in urban conservation and regeneration in India and other countries.

UNIT V   CONSERVATION MANAGEMENT   6

Conservation management, community participation, economic regeneration, upgrading infrastructure, financing and implementation frame work for redevelopment and revitalisation projects.

TOTAL : 45 PERIODS

OUTCOME

- Understanding of the need and benefits of urban conservation.
- Ability to carry forth knowledge and convictions with respect to conservation in the realm of practice/ research.

REFERENCES

- Donald Appleyard, 'The Conservation of European Cities', M.I.T. Press, Massachusetts, 1979.
- James M. Fitch, 'Historic Preservation: Curatorial Management of the Built World', University of Virginia Press, 1990.
- Robert E. Stipe, 'A Richer Heritage: Historic Preservation in the Twenty – First Century', University of North Carolina Press, 2003.
- Bernard M.Feilden, 'Conservation: A Technical Manual', Indian National Trust for Art and Cultural Heritage, 1989.
- Bernard M.Feilden, 'Conservation of Historic Buildings', Taylor & Francis Ltd, UK, 2003.
- Nahoum Cohen, 'Urban Conservation', M.I.T. Press, 1999.
- GregersAlgreenUssing, 'Urban Space and Urban Conservation as an Aesthetic Problem: Lectures Presented at the International Conference in Rome', L Erma di Bretschneider, Rome 2000.
- Jamie MacKee,'Evaluation in Urban Conservation: Case Studies on the Application of evaluation in conservation decision-making for the inclusion of cultural Built Heritage in Modern Urban Centres', VDM Verlag, 2009.
- Donald Insall, 'Living Buildings: Architectural Conservation: Philosophy, Principles and Practice', Images Publishing Dist Ac, 2008.

AA5009   **EMERGING PRACTICES IN HOUSING**   **L T P/S C**
                                                                             3 0 0 3

OBJECTIVES

- To give an outline of the evolution of housing to its present forms.
- To give familiarity with respect to redefinition of contemporary housing within the contexts of multicultural cities due to globalisation.

UNIT I   INTRODUCTION   9
Introduction to housing, from its industrial beginnings in London and Paris to New York City's Lower East Side and the 20th century designs of Le Corbusier, Antonio Sant'Elia, and Mies van der Rohe. Investigation of contemporary life and its influence on space and architecture. Globalisation and influences on economy. Alternate housing solutions: Commune, Co Housing, Cooperatives, etc.

UNIT II   SINGLE FAMILY, MULTI FAMILY HOUSING   9
Review of latest developments in single family and multifamily housing by examining the works of WielArets, Shigeru Ban, Ben van Berkel, KeesChristiaanse, Philippe Gazeau, Frank O. Gehry, Steven Holl, Hans Kollhoff, MorgerandDegelo,, Jean Nouvel, KasOosterhuis, MVRDV.

UNIT III   HIGH DENSITY HOUSING   7
Issues and concerns of high density housing. Review of the current state of high density houses.Perspectives and future developments through a study of a few international projects.

UNIT IV   NEW FORMS OF LIVING AND HOUSING IN THE DIGITAL ERA   7
Hyper Housing. Multi-cultural Housing.Lab rooms and cyber homes. Network housing. Hybrid buildings. Individual sheltered residences. Residence cities and bio homes for senior citizens. Works of UN Studio, FOA, OMA.

UNIT V   CONTEMPORARY HOUSING IN THE INDIAN CONTEXT   13
Social and economic changes in India in the 21st century. Impact on housing form and its evolution. Housing policies today. Case studies of government, market oriented projects and innovations by architects for the current scenario.

                                                                    TOTAL:45 PERIODS

OUTCOME

- Sensitivity to the various forces that shape the form of housing today.
- Knowledge about the latest development, issues and design strategies governing housing at national and international level.

REFERENCES

- Jaime Salazer, Manuel Gausa, 'Single Family Housing', Birkhauser Verlag AG, 2005.
- Vicente Guallart, 'Sociopolis: Project for a City of the Future', ACTAR, 2004.
- Jingmin Zhou, 'Urban Housing Form', Architectural Press, 2005.
- Adrienne Schmitz, 'Multifamily Housing Development Handbook', Urban Land Institute, 2000.
- CarlesBronto, 'Innovative Public Housing', Links Internacional, 2005.
- Rahul Mehrotra, 'Architecture in India since 1990', HatjeCantz, 2011.

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AA5024   **URBAN INFRASTRUCTURE AND MANAGEMENT**   **L T P/S C**
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OBJECTIVES
- To provide basic knowledge on the functions, dynamics, planning and management of urban infrastructure systems.
- To give understanding about the dynamics within and between urban infrastructure systems, and their relation to the built environment and economic development.
- To give knowledge about how to assess the qualities of infrastructure systems in terms of vulnerability, sustainability, equity and efficiency.

UNIT I   INTRODUCTION, TRANSPORTATION,POWER AND COMMUNICATION   18
An overview of different types of urban infrastructures. Status of urban and rural infrastructure in India. Road Transportation- Design criteria for road, types of traffic and transportation survey, types of roads, infrastructure for road, facilitating pedestrians. Power and communication system - source and distribution networks with safety norms applicable.
Study and design exercises in the above

UNIT II   WATER SUPPLY AND DRAINAGE   18
Water supply systems. Quality and quantity requirements. Sources. Collection and conveyance of water. Treatment methods, treatment plant location. Planning distribution systems and their zoning with respect to urban structure.
Factors determining layout of urban drainage and sewerage system. Sewage treatment plant location and functioning. Waste water disposal systems- separate and combined systems. Characteristics of waste water. Industrial pollutants and their effects. Waste water treatment methods. Planning and location of treatment plants. Disposal of municipal and industrial effluents, effects of rivers and water bodies. Legal aspects.

Study and design exercises in the above.

UNIT III   SOLID WASTE MANAGEMENT   12
An overview of solid waste. Solid waste collection and disposal issues due to solid waste disposal, planning and design criteria with case studies. Solid waste collection and disposal: Elements of solid wastes management. Classification and properties of solid wastes. On site collection, storage, transportation and disposal of solid wastes. Processing and treatment of solid wastes. Various social aspects of the solid waste management.

Study and design exercises in the above.

UNIT IV   INFRASTRUCTURE AND ENVIRONMENT   12
Planning, layout of service lines and interface at building and city scale infrastructure. Green building concepts. Environmental Impact Assessment. Effects of improper infrastructure. Environmental laws. Case studies in the above.

                                                                TOTAL: 60 PERIODS

OUTCOME
- Understanding about the infrastructure system at micro level to macro level.
- Ability to plan integrating all aspects of infrastructure for a sustainable development.

REFERENCES
- N.Mani, 'Infrastructure Planning and Development in India', New Century Publication, 2012.
- Kenneth C Clayton, 'Solid waste management: The Regional approach', Ballinger Pub. Co, 1973.
- Chatterjee A.K, 'Water Supply, Waste Disposal and Environmental Engineering', Khanna Publishers, 2010.
- Waldram, J. M, L. T. Minchin, 'Street Lighting', Edward Arnold, London, 1952.
- V.M. Ehlers, Ernest W. Steel, 'Municipal and Rural Sanitation', McGraw-Hill Inc, US,1977.
- AmodS.Tilak, 'Environmental Law', Snow White Publications Pvt. Ltd, 2009.
- HPEC Government of India, 'Report on Indian Urban Infrastructure and Services', The High Powered Expert Committee for estimating the Investment Requirements for Urban Infrastructure Services, New Delhi, 2011.

ENVIRONMENTAL IMPACT ASSESSMENT **L T P/S C**
2 0 2 3

OBJECTIVES

- To give exposure to the need, methodology, documentation and usefulness of environmental impact assessment.
- To enable the development of skill to prepare environmental management plan.

UNIT I BASICS OF ENVIRONMENTAL IMPACT ASSESSMENT 14

Historical development of Environmental Impact Assessment (EIA). EIA in Project Cycle. Legal and Regulatory aspects in India. Types and limitations of EIA .Cross sectoral issues and terms of reference in EIA. Public Participation in EIA. EIA process- screening, scoping, setting, analysis, mitigation.

Matrices. Networks. Checklists. Connections and combinations of processes. Cost benefit analysis. Analysis of alternatives.

UNIT II METHODS 16

Software packages for EIA. Expert systems in EIA. Prediction tools for EIA. Mathematical modeling for impact prediction. Assessment of impacts. Air, water, soil, noise, biological. Definition of social impact assessment. Social impact assessment model and the planning process. Rationale and measurement for SIA variables. Cumulative Impact Assessment. Documentation of EIA findings. Planning. Organisation of information and visual display materials. Report preparation. EIA methods in other countries. Case studies and exercises .

UNIT III EIA OF PROJECTS 16

Regional and strategic assessments. Elements of EIA – prediction and assessment of impacts on the physical, chemical, biological and socio economical environmental. EIA methodologies, cost-benefit analysis, comparison of alternatives, public participation, mitigation plans, monitoring plans, environmental management plan. Expert system in EIA. Quantifying the urban environment. Urban heat islands. Prediction and evaluation of the urban environment. Ecological footprint of cities. Cognitive, analytical and simulated modelling and design of buildings. Zero Carbon Footprint Building.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN 14

Environmental Management Plan. Preparation, implementation and review. Mitigation and Rehabilitation Plans. Policy and guidelines for planning and monitoring programmes. Post project audit. Ethical and Quality aspects of Environmental Impact Assessment.

TOTAL: 60 PERIODS

OUTCOME

- Understanding about the significance of environmental impact assessment.
- Ability to prepare basics of environmental management plan.
- Knowledge about the legal requirements of Environmental and Risk Assessment for projects.

REFERENCES

- Canter L.W, 'Environmental Impact Assessment', McGraw Hill, 1997.
- Lawrence D.P, 'Environmental Impact Assessment Practical solutions to recurrent problems', New Jersey, 2003.
- Nick Harvey, Beverley Clarke, 'Environmental Impact Assessment: Procedures and Practices', Oxford University Press, USA, 2012.
- Petts J, 'Handbook of Environmental Impact Assessment Vol., I and II', Blackwell Science, London, 1999.
- World Bank, 'Environmental Assessment sourcebook', World Bank, 1991.
- EIA Manual – Download from the website of ministry of environment and forests (MOEF) –
- Government of India. - 'EIA Manual', Ten Sectoral Manuals under EIA Notification, 2006. Available from:
  <http://environmentclearance.nic.in/writereaddata/Form-1A/HomeLinks/ommodel2.html>

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AA5010 **FACILITIES PROGRAMMING AND MANAGEMENT FOR** **L T P/S C**
ARCHITECTURE **3 0 0 3**

OBJECTIVE

- To enable development of capability to plan for and manage various aspects of building so as to give user satisfaction and safety.

UNIT I BASICS OF ARCHITECTURAL PROGRAMMING **7**
Introduction to Architectural Programming. Design process stages: analysis, synthesis and evaluation. Framework for information covering the whole problem. Different approaches to architectural programming.

UNIT II BASICS OF FACILITIES MANAGEMENT **11**
Principle duties of a facility manager. Business aspects of facilities management. Diverse responsibilities and decision-making processes from building infrastructure to fleet services.

UNIT III FACILITIES DESIGN AND SPACE PLANNING **11**
Applications of facilities design in defining the requirements of a project. Developing design strategies, implementing corporate philosophies and methodologies, and understanding the project development process. Flexibility and facilities planning. Optimal space planning and cost minimisation through facility layout.

UNIT IV FACILITY PLANNING AND DECISION SUPPORT SYSTEM **9**
Knowledge based facility planning and decision support system. Application of artificial intelligence. Graphical and theoretic approach to multi-floor building design. Facility layout algorithm using graphics. Simulation in facility planning and efficiency analysis

UNIT V FACILITY MANAGEMENT DURING CONSTRUCTION PHASE & HANDOVER **7**
Types of facility management options. Functionality of Building Automation systems. Wear and tear of technical installations. Recording operating costs, safety concepts, energy supply and waste management. Service tenders and contracts.

TOTAL: 45 PERIODS

OUTCOME
- Familiarity about facilities programming in planning a building.
- Understanding of the relation between facilities planning and and facilities management and their importance, especially in the context of service-oriented spaces and building types.

REFERENCES
- Richard Payant, Kathy O. Roper, 'The Facility Management Handbook', AMACOM, 2014.
- Bernard Lewis and Richard Payant, 'Facility Manager's Maintenance Handbook', McGraw Hills, 2007.
- Keith Alexander, Brian Atkin, Jan Bröchner, and Tore Haugen, 'Facilities Management: Innovation and Performance', Routledge, 2004.
- Eric Teicholz,' Facility Design and Management Handbook', McGraw Hill Professional, 2001.
- Frank Booty, 'Facilities Management Handbook', Fourth Edition, Elsevier, 2009.
- William M. Pena , Steven A. Parshall, 'Problem Seeking: An Architectural Programming Primer', 5th Edition, Wiley, 2012.

AA5011 **ENVIRONMENTAL PSYCHOLOGY** **L T P/S C**
3 0 0 3
OBJECTIVES
- To give introduction to the realm of environmental psychology.
- To introduce interdisciplinary social science approaches and to explore ways that people experience environments and make decisions about them.

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UNIT I   INTRODUCTION TO ARCHITECTURAL PSYCHOLOGY   9

Introduction to the discipline, its importance in the field of architecture. Understanding the principle of psychology- Form, perception, attention, concepts, types of concepts, physical settings and varied emotions. Creative Thinking: Process of creativity, visual and creative thinking. Types of thinking- directed thinking, convergent, divergent. Articulation of masses and spaces, sense and sensation modalities. Language of architecture and its role in creativity, like rhythm, harmony, balance and other visual traits.

UNIT II   ENVIRONMENTAL RESPONSE   9

Environmental variables-fixed feature variable, semi-permanent feature variable, ambient feature variable and human comportment, human adaptation to the given environment, collective behaviour and spatial orders, effects of colour and behaviour in built environment

UNIT III   CONCEPT OF BEAUTY AND HUMAN ATTITUDE   9

Philosophies of beauty, aesthetics and physio -psychological association to it and the human mind, simulated by 'pull' and 'push' factors of the environment physical manifestation and emotional impact attitudes towards typical physical settings form, space and attitude relations.

UNIT IV   APPLICATION OF PSYCHOLOGY IN ARCHITECTURE DESIGN   9

Evaluation of the satisfactory levels of a residential building. Parameters to provoke desired emotions in the built environment application of the knowledge in the design of a residence, community, neighbourhood in all stages of design.

UNIT V   PSYCHOLOGY OF SUSTAINABLE BEHAVIOR / GREEN INTERVENTIONS   9

The green organizational imperative. Green work performance. The psychology of going green. Green recruitment, development and engagement. Maslow's Hierarchy of Needs. Herberg's Theory. The Cycle of organisational Change and Progression. Challenges to sustainability and participation.

TOTAL: 45 PERIODS

OUTCOME
- Knowledge of application of psychology in architectural design.

REFERENCES
- Bakker, A.B. and Leiter, M.P. 'Work Engagement; A Handbook of Essential Theory and Research', Psychology Press, 2010.
- Canter D.V and Lee.T,'Psychology and the Built Environment', Architectural Press, London, 1974.
- Hall E.T, 'The Hidden Dimension',Anchor, 1990.
- Kayem,S.M., 'Psychologyin relation to design', Dowden, Hutchinson and Ross, 1973.
- Morgan T. of Clifford, 'Introduction to Psychology', Tata McGraw–Hill Publications, New York, 1983.
- Proshansky. H.M, 'TheField of Environmental Psychology: Securing its Future', Wiley, 2002.
- D. Stokols and I. Altman, 'Handbook of Environmental Psychology', New York, John Wiley and Sons, 1987.
- Proshansky. H.M, Ittleson. W.H, Rivlin. L.G, 'Environment Psychology- People and Their Physical Settings', New York, Holt, Rinchatand Winston, 1976.

| AA5012 | PSYCHOLOGY OF LEARNING AND DEVELOPMENT | L T P/S C |
| | | 3 0 0 3 |

OBJECTIVES
- To introduce general concepts of learning theory.
- To help understand research related to theories of learning.
- To enable opportunity to engage in critical analysis of theories through discussions.

UNIT I   INTRODUCTION   7
Introduction to learning. Behaviourism - Classical and Operant. Social Learning Theory. Taxonomies. Mastery Learning. Cognitive Information Processing. Problem Solving, Transfer. Meaningful Learning. Situated Cognition. Development and Learning. Interactional Theories of Learning. Nature and Meaning of Psychology. Methods and Scope Psychology.

UNIT II   EDUCATIONAL PSYCHOLOGY   9
Nature and Meaning of Educational Psychology. Functions Educational Psychology. Physical, Social, Emotional and Cognitive development patterns. Stage. Specific Characteristics of Infancy and Childhood and their developmental tasks. Characteristics and Problems of Adolescents. Needs, aspiration, attitudes and Self-concept of Adolescents. Guidance and Counselling for adolescents.

UNIT III   UNDERSTANDING LEARNER STAGES OF HUMAN DEVELOPMENT   9
Cognitive Development. The Self, Social, and Moral Development. Learner Differences and Learning Needs. Language Development. Language Diversity and Immigrant Education. Culture and Diversity, Behavioural Views of Learning. Cognitive Views of Learning. Complex Cognitive Processes.

UNIT IV   LEARNING AND MOTIVATION   11
Concept of learning and its nature. Factors influencing learning – Personal and Environmental. Motivation – Nature, Types. Techniques of enhancing learner's motivation. Theory of Learning. Operant Conditioning theory of learning. Gestalt theory of Learning. Learning goals with classroom activities, create motivating and inclusive environments, and integrating assessment into learning. Frameworks like Backward Design. Effective teaching and learning frameworks from psychological, cognitive, sociological, and educational research.

UNIT V   APPRECIATION AND CRITICISM   9
Ability of Understanding– appreciation, advocatory, descriptive, evaluative, interpretative and other evaluation criteria and methodology. Development of Design Thoughts-understanding, developing and expressing a design thought in its right perspective purpose, manner and mode. Theories and models for experiencing architecture.

TOTAL: 45 PERIODS

OUTCOME
- Knowledge about major social and psychological processes involved in learning and development in an educational setting.
- Ability to engage in knowledgeable and productive dialogue with colleagues about human learning, development, and educational practice.

REFERENCES
- Ellen D. Gagne, Carol Walker Yekovich, Frank R. Yekovich,' The Cognitive Psychology of School Learning' , Pearson, 1997.
- Derville, Leonore, M.T ,'The use of Psychology in Teaching', Longman London, 1982.
- Biggs, Jhon B, 'The Process of Learning', Pearson Higher Education,1993.
- McShane, J, 'Cognitive Development, An Information Processing Approach Basic', Black Well, Oxford, 1991.
- Glover, J.A and Bruning,'Educational Psychology Principles and Applications, Pearson, 1990.
- Dececco J.P, 'Psychology of Learning and Instruction: Educational Psychology', Prentice Hall of India Ltd, NewDelhi, 1970.
- Herbert J. Klausmeier, Richard E. Ripple, 'Learning and Human Abilities: Educational Psychology', Joanna Cotler Books, 1975.
- Carol Davidson Cragoe, 'How to Read A Building', Rizzoli, 2008.

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AA5013   **THEORY OF ARCHITECTURE EDUCATION**   **L T P/S C**

                                                                          3 0 0 3

OBJECTIVES
- To give familiarity about theories of architectural education.
- To introduce the idea of cognition development.
- To give familiarity about ways of thinking and learning with respect to architecture.

UNIT I   INTRODUCTION   7

Overview of the important aspects of the discipline of architecture. Nature of Architectural Education based on the nature of the discipline of architecture.

UNIT II   TOOLS/ TECHNIQUES TO TEACH ARCHITECTURE   9

Models and methods of Teaching. Teaching Aids In Architecture Education. Types of Teaching Aids- Visual, Audio, etc., Learning by Doing, reflection, exploring, arguing, incidentally. Case-Based Teaching. Advanced Organizer, Concept attainment model, Simulations.

UNIT III   SYNECTICS AS A MODEL OF TEACHING.   9

The essence of creativity in synectics. Use of synectics in the design studio. Techniques of teaching-learning: Maxims of teaching and its application to subjects of architecture. Concept mapping, creating concept maps. Basic aspects of classroom management.

UNIT IV   STUDENT DEVELOPMENT   11

Need of development. Cognitive Development. Connection between seeing and remembering. Memory Retention. Attention Span. Organizing Communication. Comprehension. Create a Focal Point. Evolution of technology in education. Testing of module/ survey conducted.

UNIT V   LEARNING IN ARCHITECTURE DESIGN STUDIO   9

Development of Critical, Creative and Pragmatic Thinking in Architectural Design Studio. Bloom Taxonomy in Design Studio. Qualities which can be attained at various stages in Architectural Design Studio.

                                                            TOTAL: 45 PERIODS

OUTCOME
- Awareness of the importance of contextual excellence in architectural design and methods for the same.
- Knowledge about and ability to integrate interdisciplinary and cognitive aspects of learning, teaching and development.

REFERENCES
- S. K. Mangal, 'Essential of Educational Technology', PHI Learning Pvt. Ltd., 2009.
- Bruce Joyce, Emily Calhoun, Marsha Weils, 'Models of Teaching', Pearson, 2014.
- Klausmier, Ripple,'Learning and Human Abilities' Harper and Row, New York, 1971.
- Eames Charles, Ray, 'An Eames Anthology', Yale University Press, 2015.

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AA5026	ARCHITECTURAL JOURNALISM AND PHOTOGRAPHY	L T P/S C
		2 0 2 3

OBJECTIVES
- To introduce basic objectives, methods and skills for practice of professional journalism with particular emphasis on architectural journalism.
- To introduce and explore photography as an important aspect of journalism and as a standalone requirement for the architectural profession.

UNIT I INTRODUCTION TO JOURNALISM. ' 12

Introduction to journalism, its key concepts and objectives. Different types of journalism. Architectural journalism as a specialised area. Outline of aspects related to journalism - research, reporting, writing, editing, photography, columns, public relationship, criticism. Knowledge about copyright, policies, etc.,. Code of ethics. Basic knowledge of press laws, Press Council of India.

UNIT II TECHNIQUES AND SKILLS FOR JOURNALISM 16

Interviewing skills, developing sources, argument and debate as a technique in the investigation of social problems. Evidence, proof, refutation, persuasion. Training in argumentative speaking. Introduction to software needed in journalism and photography, video coverage, walk-through of buildings, production of contemporary architectural journalism. Understanding the individual demands in the context of newspapers, radio, film, and television. Role of the editor. Editing of articles, features and other stories. Editing for online newspaper and magazines. Text preparation, mode of presentation, standards and guidelines for documentation. Multimedia/ online journalism and digital developments.
Exercises in the above.

UNIT III DISCUSSIONS AND ISSUES ON ARCHITECTURE 12

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

UNIT IV ARCHITECTURAL PHOTOGRAPHY 20

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

TOTAL: 60 PERIODS

OUTCOME
- Knowledge and skill in the basics of journalism.
- Familiarity with the scope of architectural journalism.
- Skill in architectural photography.

REFERENCES
- Edward Jay Friedlander and John Lee, 'Feature Writing for Newspapers and Magazines', 7thEdition, Pearson, 2010.
- David Fuller and Patricia Waugh, eds., 'The Arts and Sciences of Criticism', Oxford: Oxford University Press, 1999.
- James Foust, 'Online Journalism Principles and Practices of News for the Web', Routledge, 2011.

- M. Harris, 'Professional Interior Photography', Focal Press, 2003.
- Martin Huckerby, 'The Net for Journalists: A Practical Guide to the Internet for Journalists in Developing Countries', UNESCO/Thomson Foundation/ Common wealth Broadcasting Association, 2005.
- S. J. A.Ward, 'Philosophical Foundations of Global Journalism Ethics', Journal of Mass Media Ethics, Vol. 20, No. 1, 3-21, 2005.
- M. Heinrich, 'Basics Architectural Photography', Bikhauser Verlag AG, 2008.
- Gerry Kopelow, 'Architectural Photography: The Digital Way', Princeton Architectural Press, 2007.

AA5027	EXPLORATIONS IN ARCHITECTURAL FORM	L T P/S C
		2 0 2 3

OBJECTIVES

- To inform about aspects, concepts and methods related to some contemporary architectural design processes.
- To enable use of contemporary processes in order to generate architectural form for specific design situations.

UNIT I   DIAGRAMMING   15

Introduction to diagramming and its history. Traditional diagrams. Contemporary diagramming processes as tool to creative interpretation and design of architectural form.
Simple exercises in diagramming.

UNIT II   SHAPE GRAMMAR AND FRACTALS   15

Introduction to shape grammar and its applications. Introduction to Fractals. Examples from nature and built environment. Types of fractals. Fractal creation, generator and initiator, direction and proportion.

Simple design exercises in shape grammar and fractals.

UNIT III   EVOLUTIONARY ALGORITHMS   15

Introduction to evolutionary algorithms. Evolutionary art. Optimisation. Synthesis of topology, geometry and component properties of a structure using genetic algorithm.
Simple design exercises based on evolutionary algorithm.

UNIT IV   PARAMETRIC DESIGN   15

Introduction to parametric design. Concept of scripting.
Simple design exercises in parametric design.

TOTAL: 60 PERIODS

OUTCOME

- Familiarity with some basic contemporary processes of architectural design.
- Ability to explore architectural form through contemporary processes.

REFERENCES

- Mark Garcia, 'The Diagrams of Architecture', Wiley, 2010.
- Jane Burry, Mark Burry, 'The New Mathematics of Architecture', Thames and Hudson, 2012.
- Peter Szalapaj, 'Contemporary Architecture and the Digital Design Process', Architectural Press, 2005.
- Bovill. C, 'Fractal Geometry in Architecture and Design', Birkhauser, Boston, 1996.
- Stephen Todd and William Latham, 'Evolutionary Art and Computers', Academic Press, 1999.
- Melanie Mitchell, 'An Introduction to Genetic Algorithms', MIT Press, 1998.

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AX5091	ENGLISH FOR RESEARCH PAPER WRITING	L T P C
		2 0 0 0

OBJECTIVES
- Teach how to improve writing skills and level of readability
- Tell about what to write in each section
- Summarize the skills needed when writing a Title
- Infer the skills needed when writing the Conclusion
- Ensure the quality of paper at very first-time submission

UNIT I   INTRODUCTION TO RESEARCH PAPER WRITING   6
Planning and Preparation, Word Order, Breaking up long sentences, Structuring Paragraphs and Sentences, Being Concise and Removing Redundancy, Avoiding Ambiguity and Vagueness

UNIT II   PRESENTATION SKILLS   6
Clarifying Who Did What, Highlighting Your Findings, Hedging and Criticizing, Paraphrasing and Plagiarism, Sections of a Paper, Abstracts, Introduction

UNIT III   TITLE WRITING SKILLS   6
Key skills are needed when writing a Title, key skills are needed when writing an Abstract, key skills are needed when writing an Introduction, skills needed when writing a Review of the Literature, Methods, Results, Discussion, Conclusions, The Final Check

UNIT IV   RESULT WRITING SKILLS   6
Skills are needed when writing the Methods, skills needed when writing the Results, skills are needed when writing the Discussion, skills are needed when writing the Conclusions

UNIT V   VERIFICATION SKILLS   6
Useful phrases, checking Plagiarism, how to ensure paper is as good as it could possibly be the first- time submission

TOTAL: 30 PERIODS

OUTCOMES
CO1 –Understand that how to improve your writing skills and level of readability
CO2 – Learn about what to write in each section
CO3 – Understand the skills needed when writing a Title
CO4 – Understand the skills needed when writing the Conclusion
CO5 – Ensure the good quality of paper at very first-time submission

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

REFERENCES
1. Adrian Wallwork , English for Writing Research Papers, Springer New York Dordrecht Heidelberg London, 2011
2. Day R How to Write and Publish a Scientific Paper, Cambridge University Press 2006
3. Goldbort R Writing for Science, Yale University Press (available on Google Books) 2006
4. Highman N, Handbook of Writing for the Mathematical Sciences, SIAM. Highman's book 1998.

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AX5092   **DISASTER MANAGEMENT**   **L T P C**
                                                                                2 0 0 0

OBJECTIVES

- Summarize basics of disaster
- Explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
- Illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
- Describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
- Develop the strengths and weaknesses of disaster management approaches

UNIT I   INTRODUCTION   6

Disaster: Definition, Factors and Significance; Difference between Hazard And Disaster; Natural and Manmade Disasters: Difference, Nature, Types and Magnitude.

UNIT II   REPERCUSSIONS OF DISASTERS AND HAZARDS   6

Economic Damage, Loss of Human and Animal Life, Destruction Of Ecosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man-made disaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.

UNIT III DISASTER PRONE AREAS IN INDIA   6

Study of Seismic Zones; Areas Prone To Floods and Droughts, Landslides And Avalanches; Areas Prone To Cyclonic and Coastal Hazards with Special Reference To Tsunami; Post-Disaster Diseases and Epidemics

UNIT IV DISASTER PREPAREDNESS AND MANAGEMENT   6

Preparedness: Monitoring Of Phenomena Triggering a Disaster or Hazard; Evaluation of Risk: Application of Remote Sensing, Data from Meteorological And Other Agencies, Media Reports: Governmental and Community Preparedness.

UNIT V RISK ASSESSMENT   6

Disaster Risk: Concept and Elements, Disaster Risk Reduction, Global and National Disaster Risk Situation. Techniques of Risk Assessment, Global Co-Operation in Risk Assessment and Warning, People's Participation in Risk Assessment. Strategies for Survival

TOTAL : 30 PERIODS

OUTCOMES

   CO1:   Ability to summarize basics of disaster
   CO2:   Ability to explain a critical understanding of key concepts in disaster risk reduction and humanitarian response.
   CO3:   Ability to illustrate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
   CO4:   Ability to describe an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations.
   CO5:   Ability to develop the strengths and weaknesses of disaster management approaches

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

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REFERENCES
1. Goel S. L., Disaster Administration And Management Text And Case Studies",Deep & Deep Publication Pvt. Ltd., New Delhi,2009.
2. NishithaRai, Singh AK, "Disaster Management in India: Perspectives, issues and strategies" NewRoyal book Company,2007.
3. Sahni, PardeepEt.Al. ," Disaster Mitigation Experiences And Reflections", Prentice Hall OfIndia, New Delhi,2001.

AX5093   **SANSKRIT FOR TECHNICAL KNOWLEDGE**   **L T P C**
                                                                 2 0 0 0

OBJECTIVES
- Illustrate the basic sanskrit language.
- Recognize sanskrit, the scientific language in the world.
- Appraise learning of sanskrit to improve brain functioning.
- Relate sanskrit to develop the logic in mathematics, science & other subjects enhancing the memory power.
- Extract huge knowledge from ancient literature.

UNIT I   ALPHABETS   6
Alphabets in Sanskrit

UNIT II   TENSES AND SENTENCES   6
Past/Present/Future Tense - Simple Sentences

UNIT III ORDER AND ROOTS   6
Order - Introduction of roots

UNIT IV SANSKRIT LITERATURE   6
Technical information about Sanskrit Literature

UNIT V TECHNICAL CONCEPTS OF ENGINEERING   6
Technical concepts of Engineering-Electrical, Mechanical, Architecture, Mathematics

TOTAL: 30 PERIODS

OUTCOMES
- CO1 - Understanding basic Sanskrit language.
- CO2 - Write sentences.
- CO3 - Know the order and roots of Sanskrit.
- CO4 - Know about technical information about Sanskrit literature.
- CO5 - Understand the technical concepts of Engineering.

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

REFERENCES
1. "Abhyaspustakam" – Dr. Vishwas, Samskrita-Bharti Publication, New Delhi
2. "Teach Yourself Sanskrit" Prathama Deeksha-Vempati Kutumbshastri, Rashtriya Sanskrit Sansthanam, New Delhi Publication
3. "India's Glorious Scientific Tradition" Suresh Soni, Ocean books (P) Ltd., New Delhi, 2017.

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AX5094   **VALUE EDUCATION**   **L T P C**
                                                                      2 0 0 0

OBJECTIVES

Students will be able to

- Understand value of education and self-development
- Imbibe good values in students
- Let the should know about the importance of character

UNIT I

Values and self-development–Social values and individual attitudes. Work ethics, Indian vision of humanism. Moral and non-moral valuation. Standards and principles. Value judgements

UNIT II

Importance of cultivation of values. Sense of duty. Devotion, Self-reliance. Confidence, Concentration. Truthfulness, Cleanliness. Honesty, Humanity. Power of faith, National Unity. Patriotism. Love for nature, Discipline

UNIT III

Personality and Behavior Development-Soul and Scientific attitude. Positive Thinking. Integrity and discipline. Punctuality, Love and Kindness. Avoid fault Thinking. Free from anger, Dignity of labour. Universal brother hood and religious tolerance. True friendship. Happiness Vs suffering, love for truth. Aware of self-destructive habits. Association and Cooperation. Doing best for saving nature

UNIT IV

Character and Competence–Holy books vs Blind faith. Self-management and Good health. Science of reincarnation. Equality, Nonviolence, Humility, Role of Women. All religions and same message. Mind your Mind, Self-control. Honesty, Studying effectively.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to

- Knowledge of self-development.
- Learn the importance of Human values.
- Developing the overall personality.

Suggested reading

1. Chakroborty, S.K.“Values and Ethics for organizations Theory and practice”, Oxford University Press, New Delhi

AX5095   **CONSTITUTION OF INDIA**   **L T P C**
                                                                     2 0 0 0

OBJECTIVES

Students will be able to:

- Understand the premises informing the twin themes of liberty and freedom from a civil rights perspective.
- To address the growth of Indian opinion regarding modern Indian intellectuals' constitutional
- Role and entitlement to civil and economic rights as well as the emergence nation hood in the early years of Indian nationalism.
- To address the role of socialism in India after the commencement of the Bolshevik Revolutionin1917and its impact on the initial drafting of the Indian Constitution.

UNIT I   HISTORY OF MAKING OF THE INDIAN CONSTITUTION

History, Drafting Committee, (Composition & Working)

UNIT II   PHILOSOPHY OF THE INDIAN CONSTITUTION

Preamble, Salient Features

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UNIT III   CONTOURS OF CONSTITUTIONAL RIGHTS AND DUTIES

Fundamental Rights, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles of State Policy, Fundamental Duties.

UNIT IV   ORGANS OF GOVERNANCE

Parliament, Composition, Qualifications and Disqualifications, Powers and Functions, Executive, President, Governor, Council of Ministers, Judiciary, Appointment and Transfer of Judges, Qualifications, Powers and Functions.

UNIT V   LOCAL ADMINISTRATION

District's Administration head: Role and Importance, • Municipalities: Introduction, Mayor and role of Elected Representative, CEO, Municipal Corporation. Pachayati raj: Introduction, PRI: Zila Pachayat. Elected officials and their roles, CEO Zila Pachayat: Position and role. Block level: Organizational Hierarchy(Different departments), Village level:Role of Elected and Appointed officials, Importance of grass root democracy.

UNIT VI   ELECTION COMMISSION

Election Commission: Role and Functioning. Chief Election Commissioner and Election Commissioners - Institute and Bodies for the welfare of SC/ST/OBC and women.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to:

- Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics.
- Discuss the intellectual origins of the framework of argument that informed the conceptualization
- of social reforms leading to revolution in India.
- Discuss the circumstances surrounding the foundation of the Congress Socialist Party[CSP] under the leadership of Jawaharlal Nehru and the eventual failure of the proposal of direct elections through adult suffrage in the Indian Constitution.
- Discuss the passage of the Hindu Code Bill of 1956.

Suggested reading

1. The Constitution of India,1950(Bare Act),Government Publication.
2. Dr.S.N.Busi, Dr.B. R.Ambedkar framing of Indian Constitution,1st Edition, 2015.
3. M.P. Jain, Indian Constitution Law, 7th Edn., Lexis Nexis,2014.
4. D.D. Basu, Introduction to the Constitution of India, Lexis Nexis, 2015.

AX5096   **PEDAGOGY STUDIES**   **L T P C**
                                                  2 0 0 0

OBJECTIVES

Students will be able to:

- Review existing evidence on there view topic to inform programme design and policy
- Making under taken by the DfID, other agencies and researchers.
- Identify critical evidence gaps to guide the development.

UNIT I   INTRODUCTION AND METHODOLOGY

Aims and rationale, Policy background, Conceptual framework and terminology - Theories of learning, Curriculum, Teacher education - Conceptual framework, Research questions - Overview of methodology and Searching.

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UNIT II   THEMATIC OVERVIEW

Pedagogical practices are being used by teachers in formal and informal classrooms in developing countries - Curriculum, Teacher education.

UNIT III   EVIDENCE ON THE EFFECTIVENESS OF PEDAGOGICAL PRACTICES

Methodology for the in depth stage: quality assessment of included studies - How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy? - Theory of change - Strength and nature of the body of evidence for effective pedagogical practices - Pedagogic theory and pedagogical approaches - Teachers' attitudes and beliefs and Pedagogic strategies.

UNIT IV   PROFESSIONAL DEVELOPMENT

Professional development: alignment with classroom practices and follow up support - Peer support - Support from the head teacher and the community - Curriculum and assessment - Barriers to learning: limited resources and large class sizes

UNIT V   RESEARCH GAPS AND FUTURE DIRECTIONS

Research design – Contexts – Pedagogy - Teacher education - Curriculum and assessment - Dissemination and research impact.

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to understand

- What pedagogical practices are being used by teachers informal and informal classrooms in developing countries?
- What is the evidence on the effectiveness of these pedagogical practices, in what conditions, and with what population of learners?
- How can teacher education (curriculum and practicum) and the school curriculum and guidance materials best support effective pedagogy?

Suggested reading

1. Ackers J, HardmanF (2001) Classroom interaction in Kenyan primary schools, Compare, 31(2): 245-261.
2. Agrawal M (2004)Curricular reform in schools: The importance of evaluation, Journal of Curriculum Studies, 36(3):361-379.
3. Akyeampong K (2003) Teacher training in Ghana-does it count? Multi-site teacher education research project (MUSTER) country report 1.London:DFID.
4. Akyeampong K, Lussier K, Pryor J, Westbrook J (2013) Improving teaching and learning of basic maths and reading in Africa: Does teacher preparation count? International Journal Educational Development, 33(3): 272–282.
5. Alexander RJ(2001) Culture and pedagogy: International comparisons in primary education. Oxford and Boston: Blackwell.
6. Chavan M(2003) Read India: Amass scale, rapid, 'learning to read' campaign.
7. www.pratham.org/images/resource%20working%20paper%202.pdf

AX5097   STRESS MANAGEMENT BY YOGA   L T P C
                                                          2 0 0 0

OBJECTIVES

- To achieve overall health of body and mind
- To overcome stress

UNIT I

Definitions of Eight parts of yoga.(Ashtanga)

UNIT II

Yam and Niyam - Do's and Don't's in life - i) Ahinsa, satya, astheya, bramhacharya and aparigraha, ii) Ahinsa, satya, astheya, bramhacharya and aparigraha.

UNIT III

Asan and Pranayam - Various yog poses and their benefits for mind & body - Regularization of breathing techniques and its effects-Types of pranayam

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to

- Develop healthy mind in a healthy body thus improving social health also
- Improve efficiency

SUGGESTED READING

1. 'Yogic Asanas for Group Tarining-Part-I":Janardan Swami Yoga bhyasi Mandal, Nagpur
2. "Rajayoga or conquering the Internal Nature" by Swami Vivekananda, Advaita Ashrama (Publication Department), Kolkata

AX5098	PERSONALITY DEVELOPMENT THROUGH	L T P C
	LIFE ENLIGHTENMENT SKILLS	2 0 0 0

OBJECTIVES

- To learn to achieve the highest goal happily
- To become a person with stable mind, pleasing personality and determination
- To awaken wisdom in students

UNIT I

Neetisatakam-holistic development of personality - Verses- 19,20,21,22 (wisdom) - Verses-29,31,32 (pride & heroism) – Verses- 26,28,63,65 (virtue) - Verses- 52,53,59 (dont's) - Verses-71,73,75,78 (do's)

UNIT II

Approach to day to day work and duties - Shrimad Bhagwad Geeta: Chapter 2-Verses 41, 47,48 - Chapter 3-Verses 13, 21, 27, 35 Chapter 6-Verses 5,13,17,23, 35 - Chapter 18-Verses 45, 46, 48.

UNIT III

Statements of basic knowledge - Shrimad Bhagwad Geeta: Chapter2-Verses 56, 62, 68 Chapter 12 -Verses 13, 14, 15, 16,17, 18 - Personality of role model - shrimad bhagwad geeta - Chapter2-Verses 17, Chapter 3-Verses 36,37,42 - Chapter 4-Verses 18, 38,39 Chapter18 – Verses 37,38,63

TOTAL: 30 PERIODS

OUTCOMES

Students will be able to

- Study of Shrimad-Bhagwad-Geeta will help the student in developing his personality and achieve the highest goal in life
- The person who has studied Geeta will lead the nation and mankind to peace and prosperity
- Study of Neet is hatakam will help in developing versatile personality of students.

Suggested reading

1. Gopinath, Rashtriya Sanskrit Sansthanam P, Bhartrihari's Three Satakam, Niti-sringar-vairagya, New Delhi,2010
2. Swami Swarupananda , Srimad Bhagavad Gita, Advaita Ashram, Publication Department, Kolkata, 2016.

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