ANNA UNIVERSITY, CHENNAI

NON-AUTONOMOUS AFFILIATED COLLEGES

REGULATIONS – 2021

M.ARCH. (ENVIRONNEMENTAL ARCHITECTURE) FULL-TIME PROGRAMME

CHOICE BASED CREDIT SYSTEM

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs):

I. To provide new knowledge and abilities to students in environmental architecture as a researcher / Teacher.

II. To enable students to make independent, knowledgeable judgments that are creative within the field of environmental architecture.

III. To enable students to widen the scope of their professional abilities through additional fields of study that would enhance their knowledge in intellectual, creative, technical, social and environmental realms.

IV. To encourage students to seek additional academic fields of study that would deepen their understanding of sustainable development and climate change.

V. To impart students the opportunity to contribute to a broader society in terms of environmental architecture through their future careers as researchers or teachers.

PROGRAMME OUTCOMES (POs):

On successful completion of the programme,

PO#	Programme Outcome
PO1.	Graduates will be self-sufficient in conducting research, analysis, and design work to address concerns with the built environment.
PO2.	Graduates will be able to understand to mitigate climate change issues at urban level and to expose to the steps involved in sustainable urban design projects
PO3.	Graduate will be able to resolve, Impact of advance architectural methods, urbanization and industrialization on nature. Eco-system and their relevance to environment, causes and consequences
PO4.	Graduates will be able to describe research methodologies, processes and explain their relevance to environmental architecture.
PO5.	Graduates will be able to equip to design environmentally sensitive buildings.
PO6.	Graduates will be able to contribute further to society through their design/research/ teaching.

PEO	PROGRAMME OUTCOME					
	PO - 1	PO-2	PO-3	PO-4	PO-5	PO-6
I.	3	-	-	2	3	1
II.	-	2	3	1	-	-
III.	-	3	1	-	2	2
IV.	2	1	-	3	-	-
V.	1	-	2	-	-	3

			PO1	PO2	PO3	PO4	PO5	PO6
YEAR I	SEM 1	Energy, Environment and Sustainable Development	3	2	2	2	3	2
		Environmental Impact Assessment	2	3	2	2	2	3
		Thermal Comfort and Passive Design	3	3	3	2	2	3
		Urban Ecology and Environmental Planning	2	3	3	2	2	2
		Predictive Building Modelling Software	3	-	-	2	2	3
		Environmental Design Studio I	2	3	-	2	3	2
	SEM 2	Research Methodologies in Built Environment	2	-	-	2	-	2
		Environmental Disturbances, Pollution and Remedies	2	-	-	3	2	2
		Sustainable, Energy Efficient, Building Materials and technologies	2	-	-	3	3	2
		Geographical Information Systems for Built Environment	3	-	3	3	2	-
		Professional Elective I	-	-	-	-	-	-
		Environmental Design Studio II	3	-	2	2	3	2
YEAR II	SEM 3	Life Cycle Assessment of Buildings	3	3	-	-	-	2
		Environmental Laws and Management	3	-	2	2	3	2
		Professional Elective II	-	-	-	-	-	-
		Professional Elective III	-	-	-	-	-	-
		Dissertation	3	3	-	3	3	2
		Environmental Design Studio III	3	-	2	2	3	2
		*Professional Training	2	-	-	2	2	2
	SEM 4	Elective IV	-	-	-	-	-	-
		Thesis Project	2	-	-	2	2	3

ANNA UNIVERSITY, CHENNAI
NON-AUTONOMOUS AFFILIATED COLLEGES
M. ARCH. (ENVIRONMENTAL ARCHITECTURE) FULL-TIME PROGRAMME
REGULATIONS 2021
CHOICE BASED CREDIT SYSTEM
I TO IV SEMESTERS CURRICULA AND SYLLABUS
SEMESTER I

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	EA4101	Energy, Environment and Sustainable Development	PCC	3	0	0	3	3
2.	EA4102	Thermal Comfort and Passive Design	PCC	3	0	0	3	3
3.	EA4103	Environmental Impact Assessment	PCC	3	0	0	3	3
4.	EA4104	Urban Ecology and Environmental Planning	PCC	3	0	0	3	3
5.		Audit Course I*	AC	2	0	0	2	0
THEORY CUM STUDIO								
6.	EA4121	Predictive Building Modelling Software	PAEC	1	0	3	4	4
STUDIO								
7.	EA4111	Environmental Design Studio - I	PCC	0	0	10	10	10
			TOTAL	**15**	**0**	**13**	**28**	**26**

*** Audit Course is optional**

SEMESTER II

S. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	RM4251	Research Methodologies for Built Environment	RMC	3	0	0	3	3
2.	EA4201	Environmental Disturbances, Pollution and Remedies	PCC	3	0	0	3	3
3.	EA4202	Sustainable, Energy Efficient Building Materials and Technologies	PCC	3	0	0	3	3
4.		Audit Course II*	AC	2	0	0	2	0
THEORY CUM STUDIO								
5.	MH4221	Geographical Information Systems for Built Environment	PAEC	1	0	3	4	4
STUDIO								
6.	EA4211	Environmental Design Studio - II	PCC	0	0	10	10	10
			TOTAL	**12**	**0**	**13**	**25**	**23**
PROFESSIONAL ELECTIVE								
7.		Professional Elective I	PEC	X	X	X	3	3
						TOTAL	**28**	**26**

*** Audit Course is optional**

SEMESTER III

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
THEORY								
1.	EA4301	Life Cycle Assessment of Buildings	PCC	3	0	0	3	3
2.	EA4302	Environmental Laws and Management	PCC	3	0	0	3	3
STUDIO								
3.	EA4311	Dissertation	PCC	0	0	4	4	4
4.	EA4312	Environmental Design Studio - III	PCC	0	0	10	10	10
			TOTAL	**6**	**0**	**14**	**20**	**20**
PROFESSIONAL ELECTIVE								
5.		Professional Elective II	PEC	X	X	X	3	3
6.		Professional Elective III	PEC	X	X	X	3	3
INTERNSHIP TRAINING								
7.	EA4313	Internship Training	PAEC	X	X	X	X	2
							TOTAL	**28**

SEMESTER IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
STUDIO								
1.	EA4411	Thesis Project	PCC	0	0	20	20	20
			TOTAL	**0**	**0**	**20**	**20**	**20**
PROFESSIONAL ELECTIVE								
2.		Professional Elective IV	PEC	X	X	X	3	3
							23	**23**

Total No. of Credits: 103

PROFESSIONAL CORE COURSES (PCC)

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	EA4101	Energy, Environment and Sustainable Development	PCC	3	0	0	3	3
2.	EA4102	Thermal Comfort and Passive Design	PCC	3	0	0	3	3
3.	EA4103	Environmental Impact Assessment	PCC	3	0	0	3	3
4.	EA4104	Urban Ecology and Environmental Planning	PCC	3	0	0	3	3
5.	EA4111	Environmental Design Studio - I	PCC	0	0	10	10	10

6.	RM4251	Research Methodologies for Built Environment	RMC	3	0	0	3	3
7.	EA4201	Environmental Disturbances, Pollution and Remedies	PCC	3	0	0	3	3
8.	EA4202	Sustainable Energy Efficient Building Materials and Technologies	PCC	3	0	0	3	3
9.	EA4211	Environmental Design Studio - II	PCC	0	0	10	10	10
10.	EA4301	Life Cycle Assessment of Buildings	PCC	3	0	0	3	3
11.	EA4302	Environmental Laws and Management	PCC	3	0	0	3	3
12.	EA4311	Dissertation	PCC	0	0	4	4	4
13.	EA4312	Environmental Design Studio - III	PCC	0	0	10	10	10
14.	EA4411	Thesis Project	PCC	0	0	20	20	20

PROFESSIONAL ELECTIVE COURSES (PEC)

EMESTER II, ELECTIVE I

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	EA4001	Sustainability and Energy Conservation in Landscape Architecture	PEC	3	0	0	3	3
2.	EA4002	Environment Infrastructure	PEC	3	0	0	3	3
3.	EA4003	Building Science and Sustainability	PEC	3	0	0	3	3
4.	MH4071	Environmental Psychology	PEC	3	0	0	3	3
5.	MH4073	Soft Skills	PEC	2	0	1	3	3

SEMESTER III, ELECTIVE II & III

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	EA4004	Post Occupancy Evaluation of Buildings	PEC	3	0	0	3	3
2.	EA4005	Design of Energy Efficient and Healthy Buildings	PEC	3	0	0	3	3
3.	EA4006	Carbon Foot Print and Measurement	PEC	3	0	0	3	3
4.	EA4007	Natural Resource Management	PEC	3	0	0	3	3
5.	EA4008	Environmental Management Systems and Auditing	PEC	3	0	0	3	3
6.	MH4074	Psychology of Learning and Development	PEC	3	0	0	3	3

SEMESTER IV, ELECTIVE IV

SL. NO.	COURSE CODE	COURSE TITLE	CATE-GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	EA4009	Energy, Climate Change and Urban Development	PEC	3	0	0	3	3
2.	EA4010	Theory of Environmental Planning	PEC	3	0	0	3	3
3.	EA4011	Environment, Development and Disaster Management	PEC	3	0	0	3	3
4.	MH4075	Theory of Architectural Education	PEC	3	0	0	3	3

PROFESSIONAL ABILITY ENHANCEMENT COURES (PAEC)

SL. NO.	COURSE CODE	COURSE TITLE	CATE - GORY	PERIODS PER WEEK			TOTAL CONTACT PERIODS	CREDITS
				L	T	P/S		
1.	EA4121	Predictive Building Modelling Software	PAEC	1	0	3	4	4
2.	MH4221	Geographical Information Systems for Built Environment	PAEC	1	0	3	4	4
3.	EA4313	Internship Training	PAEC	X	X	X	X	2

SUMMARY

Sl. No	Subject Area	Credits per Semester				**Credits Total**
		I	**II**	**III**	**IV**	
1	PCC	22	16	20	20	78
2	PEC	-	3	6	3	12
3	PAEC	4	4	2	-	10
4	RMC	-	3	-	-	3
	Total	**26**	**26**	**28**	**23**	**103**
5	Non-Credit	Audit Course I	Audit Course II			

EA4101 ENERGY, ENVIRONMENT AND SUSTAINABLE DEVELOPMENT L T P/S C
3 0 0 3

OBJECTIVES

- To enable sensitivity with respect to the linkages/ relationship between energy, lifestyle, food chain and sustainability.
- To facilitate understanding of appropriate technologies aiding sustainability.
- To enhance the knowledge ecological principles and system in sustainable development

UNIT I ENERGY SOURCES 08

Introduction to nexus between Energy, Environment and Sustainable Development; Energy transformation from source to services; Energy sources, sun as the source of energy; biological processes; photosynthesis; food chains, classification of energy sources, quality and concentration of energy sources; fossil fuel reserves - estimates, duration; theory of renewability, renewable resources; overview of global/ India's energy scenario.

UNIT II ECOLOGICAL PRINCIPLES 08

Ecological principles, concept of ecosystems, ecosystem theories, energy resources and their inter-linkages, energy flow, the impacts of human activities on energy flow in major man-made ecosystems- agricultural, industrial and urban ecosystems.

UNIT III ENERGY SYSTEMS AND ENVIRONMENT 09

Environmental effects of energy extraction, conversion and use; sources of pollution from energy technologies (both renewable and non-renewable); primary and secondary pollutants; consequence of pollution and population growth; air, water, soil, thermal, noise pollution -cause and effect; pollution control methods, sources and impacts; environmental laws on pollution control. Kyoto Protocol; Conference of Parties (COP); Clean Development Mechanism, Reducing Emissions from Deforestation and Degradation.

UNIT IV GREEN INNOVATION & SUSTAINABILITY 10

Criteria for choosing appropriate green energy technologies, emerging trends process/product innovation-, technological / environmental leap-frogging; Eco/green technologies for addressing the problems of Water, Energy, Health, Agriculture and Biodiversity, eco-restoration/ phyto-remediation, ecological sanitation, renewable energy technologies, industrial ecology, agro ecology and other appropriate green technologies.

UNIT V GREEN ENERGY AND SUSTAINABLE DEVELOPMENT 10

The inseparable linkages of life supporting systems, biodiversity and ecosystem services and their implications for sustainable development; global warming; greenhouse gas emissions, impacts, mitigation and adaptation; future energy Systems- clean/green energy technologies; International agreements/conventions on energy and sustainability - United Nations Framework Convention on Climate Change (UNFCC).

TOTAL: 45 PERIODS

COURSE OUTCOMES

CO1	An understanding of the linkages between the ecosystem, food web and sustainability.
CO2	Knowledge about renewable and non-renewable sources of energies and their effects on the environment.
CO3	Awareness of how human activity affects the way energy flows through the largest man-made ecosystems
CO4	Awareness of new developments in green energy technologies and innovation ideas.

REFERENCES

1. E H Thorndike, Energy & Environment: A Primer for Scientists and Engineers, Addison-Wesley Publishing Company
2. Energy and Environment Set: Mathematics of Decision Making, Loulou, Richard; Waaub, Jean-Philippe; Zaccour, Georges (Eds.), 2005, XVIII, 282 p. ISBN: 978-0 387-25351-0
3. Energy and the Challenge of Sustainability, World Energy assessment, UNDP, N York, 2000.
4. Energy and the Environment, 2nd Edition, John Wiley, 2006, ISBN:9780471172482; Authors: Ristinen, Robert A. Kraushaar, Jack J. AKraushaar, Jack P. Ristinen, Robert A., Publisher: Wiley, Location: New York, 2006.
5. R Wilson & W J Jones, Energy, Ecology and the Environment, Academic Press Inc.

CO – PO Mapping - Energy, Environment and Sustainable Development

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**3**	**-**	**-**	**2**
CO2	**-**	**3**	**-**	**2**	**-**	**-**
CO3	**-**	**2**	**2**	**-**	**3**	**-**
CO4	**3**	**-**	**-**	**2**	**-**	**3**
AVERAGE	3+3 =6/2 =**3**	3+2 =5/2=**2.5**	3+2 =5/2=**2.5**	2+2 =4/2 =**2**	3/1=**3**	2+3 =5/2=**2.5**

EA4102 THERMAL COMFORT AND PASSIVE DESIGN L T P/S C
3 0 0 3

OBJECTIVES

- To enable exploration of the relationship between architectural form, materials and environmental performance.
- To give knowledge about how this relation should evolve in response to climate and emerging technical capabilities.

UNIT I HUMAN BEHAVIOUR 09

Atmospheric and thermal comfort, building performance, and occupant health, safety, and productivity. Factors responsible, energy systems for human comfort, PPD & PMV analysis

UNIT II NATURAL INFLUENCES 09

Micro and Macro thermal comfort scales – Interpreting Material data through Bio climatic charts Sun path, Passive strategies, Solar heat gain ,Solar radiation, Stack effect ,etc.

UNIT III DESIGN ELEMENTS 09

Modifications of Architectural & Landscape Elements – Fenestration, roof, walls, flooring, trees and landscape. Climatic zones and architectural features -Courtyard, Cross ventilation, Daylight factor, Walls ,Trombe wall, Buried pipe system ,Wind, Velocity ,Wind tower etc.

UNIT IV BUILDING MATERIALS 09

Properties of building materials related to Climatic zones -Properties of Heat transfer and energy flow, U-value, Appropriate materials. Mass materials/components selection strategy - Photovoltaic-Recycled Materials-Utilization of building water conserving installation- Evaporative coolers.

UNIT V HUMAN COMFORT STANDARDS 09

Designing for optimum Day Lighting-Ventilation and Thermal Comfort Standards. Acoustics – Manmade influences –Sick Building Syndrome – Indoor Environment and design of Healthy buildings. Adaptive model of thermal comfort and its application to sustainable design of buildings.

TOTAL: 45 PERIODS

COUESE OUTCOMES

CO1	Understanding Human thermal response to natural elements and the influence of architectural design elements.
CO2	Knowledge about passive design techniques of architectural elements to achieve thermal comfort in built environment
CO3	understanding the characteristics of building materials for different climatic zones
CO4	Recognize how human thermal comfort criteria relate to sustainable building design.

REFERENCES

1. Arvind Krishan, SimosYanas, Nick Baker, S.V. Szokolay, Climate Responsive Architecture, Tata McGraw Hill Pub. Co, 2001
2. Daniel D. Chiras, The Solar House: Passive Heating and Cooling, Chelsea Green Publishing, 2002
3. David Lloyd Jones, Architecture and the Environment: Contemporary Green Buildings, Overlook Hardcover, 1998.
4. Givoni, Climate Considerations in Building and Urban Design, Wiley; 1st edition, 1998. Hawkes Dean and Foster Wayne, Energy Efficient Buildings: Architecture, Engineering, and Environment. W. W. Norton & Company; First American Edition, 2002.
5. O.H Koenisberger, Manual of Tropical housing and climate, Longman Group United Kingdom, 2012.

CO – PO Mapping - THERMAL COMFORT AND PASSIVE DESIGN

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**-**	**3**	**-**	**2**	**-**	**-**
CO2	**3**	**-**	**-**	**-**	**2**	**3**
CO3	**-**	**-**	**2**	**2**	**-**	**-**
CO4	**2**	**-**	**3**	**-**	**-**	**-**
AVERAGE	3+2 =5/2=**2.5**	3/1=**3**	3+2 =5/2=**2.5**	2+2 =4/2 =**2**	2/1=**2**	3/1=**3**

EA4103 ENVIRONMENTAL IMPACT ASSESSMENT L T P/S C
3 0 0 3

OBJECTIVES

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

UNIT I INTRODUCTION 07

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.

UNIT II COMPONENTS AND METHODS 10

Matrices – Networks – Checklists – Connections and combinations of processes - Cost benefit analysis – Analysis of alternatives – 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 — Cumulative Impact Assessment – Documentation of EIA findings – planning – organization of information and visual display materials – Report preparation. EIA methods in other countries.

UNIT III IMPACT ON SOCIO-ECONOMIC SYSTEMS 08

Definition of social impact assessment. Social impact assessment model and the planning process. Rationale and measurement for SIA variables. Relationship between social impacts and change in community and institutional arrangements. Individual and family level impacts. Communities in transition - neighborhood and community impacts. Selecting, testing and understanding significant social impacts. Mitigation and enhancement in social assessment. Environmental costing of projects.

UNIT IV ENVIRONMENTAL MANAGEMENT PLAN 10

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.

UNIT V SECTORAL EIA 10

EIA related to the following sectors - Infrastructure – construction and housing Mining – Industrial -Thermal Power - River valley and Hydroelectric – coastal projects-Nuclear Power, Hill area Development and CRZ. EIA for coastal projects.

TOTAL: 45 PERIODS

COURSE OUTCOMES

CO1	Understanding about the significance of environmental impact assessment
CO2	Understanding of how to prepare reports and organize information
CO3	Recognizing the link between social effects and community change
CO4	Skills to prepare environmental management plan.

REFERENCES

1. Canter, L.W., Environmental Impact Assessment, McGraw Hill, New York. 1996.
2. Lawrence, D.P., Environmental Impact Assessment – Practical solutions to recurrent problems, Wiley-Interscience, New Jersey, 2003.

3. Nick Harvey, Beverley Clarke, Environmental Impact Assessment: Procedures and Practices, Oxford University Press, USA, 2012.
4. Petts, J., Handbook of Environmental Impact Assessment, Vol., I and II, Blackwell Science, London, 1999.
5. World Bank –Source book on EIA.

CO – PO Mapping - ENVIRONMENTAL IMPACT ASSESSMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	-	3	-	2	-	-
CO2	3	-	-	-	2	-
CO3	-	-	3	2	-	-
CO4	-	-	-	-	-	3
AVERAGE	3/1=**3**	3/1=**3**	3/1=**3**	2+2 =4/2 =**2**	2/1=**2**	3/1=**3**

EA4104 URBAN ECOLOGY AND ENVIRONMENTAL PLANNING L T P/S C
3 0 0 3

OBJECTIVES

- To enable understanding of the basic concepts of ecology, Urban Ecology, natural systems and environment.
- To bring out awareness of the importance of Environmental planning for sustainability, resource planning and allocation and protection of natural resources and their use for sustainability.
- To enable preparation of plans considering preservation, rehabilitation and environmental policies.

UNIT I INTRODUCTION 09

Introduction to Urban Eco-systems. Basis of environmental science. Ecology, Ecosystems, Habitat, structure of the ecosystem, major ecosystems, productivity of ecosystems adaptation. Flow of energy, food chain, ecological pyramids, predation, regulatory forces. Components of natural and built environment

UNIT II CONCEPTS AND APPROACHES TO ECOLOGICAL PLANNING 09

Different types of life supporting services provided by the nature. General concept of urban ecological planning. Impact of urbanization and industrialization on nature. Resiliency and Biodiversity, resources planning and climate resilient urban development.

UNIT III HUMAN INFLUENCE ON ECO- SYSTEM 09

Examination of critical issues underlying the current and future environmental problems. Human impact on environment. Modification of natural environment – Current conditions of natural resources like land, water, air. Over exploitation of natural resources, agriculture, fishing, mineral resources, energy resource, forest wealth etc.

UNIT IV EFFECTS OF GROWING POPULATION ON ECO-SYSTEMS 10

Population and pollution, Overcrowding, congestions, hygiene and health problems. Sanitation, water supply, solid and fluid waste generation and disposal problem, changing climate of the cities-urban heat island, urban flood, etc. energy and human settlement. Ecological Land Planning: Preservation and protection of ecologically sensitive areas, Rehabilitation of degraded sites, Development of sites/ land in accordance to their environmental properties.

UNIT V GLOBAL ISSUES ON MODERN CITIES 08

Global environmental problems: Global Warming, Ozone Layer Depletion, oceans, fresh water, trans boundary air pollution, biological diversity, Carbon Rating. International treatises, Land pollution, Overview of Government of India's policies, United Nations contribution to address these issues.

TOTAL: 45 PERIODS

COURSE OUTCOMES

CO1	Understanding the importance of sustainable lifestyles and natural resource management.
CO2	knowledge of interaction between the effects of population growth and the environment
CO3	Understanding the need to conserve ecosystem and effective ways to do so.
CO4	Knowledge of government initiatives to address global environmental challenges

REFERENCES

1. D. D. Khanna, Sustainable development: environmental security, disarmament, and development interface in South Asia, Macmillan India, 1997
2. Francisco A. Comín, Ecological Restoration: A Global Challenge, Cambridge University Press, 2010.
3. John M. Marzluff, Urban Ecology: An International Perspective on the Interaction Between Humans and Nature, Springer, 2008.
4. Marina Alberti, Advances in Urban Ecology: Integrating Humans and Ecological Processes in Urban Ecosystems, Springer, 2007
5. P. D. Sharma, Ecology and Environment, Rastogi Publications, 2009
6. Saligram Bhatt, Environment Protection and Sustainable Development, APH Publishing, 2004
7. Tony Fry, Design Futuring: Sustainability, Ethics and New Practice, Berg, 2009 – Architecture.

CO – PO Mapping - URBAN ECOLOGY AND ENVIRONMENTAL PLANNING

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**-**	**2**
CO2	**-**	**-**	**3**	**-**	**2**	**-**
CO3	**-**	**3**	**3**	**2**	**-**	**-**
CO4	**2**	**-**	**-**	**-**	**-**	**3**
AVERAGE	3+2 =5/2=**2.5**	3/1=**3**	3+3 =6/2=**3**	2/1=**2**	2/1=**2**	3+2 =5/2=**2.5**

EA4121 PREDICTIVE BUILDING MODELLING SOFTWARE L T P/S C
1 0 3 4

OBJECTIVES

- To give knowledge and enable skill in modelling techniques and passive strategies for assessing the energy performance, environmental response and impact of built form.

UNIT I PREDICTIVE BUILDING MODELLING 15

Modelling-Simple Modelling, Advanced Modelling. Understanding and familiarizing with Layers and Zones, Objects and Nodes, Element, Types, Object Relationships, Display Options, Viewing the Model and Operational Modes.

UNIT II SOLAR ANALYSIS 10

Solar Analysis- Shading Analysis, Shading Design. Learning to - Display and animate complex shadows and reflections, Generate interactive sun-path diagrams for instant overshadowing analysis and Calculate the incident solar radiation on any surface and its percentage shading.

UNIT III LIGHTING ANALYSIS 10

Lighting Analysis–Day lighting Analysis, Artificial Lighting Analysis. Learning to work out daylight factors and artificial lighting levels either spatially or at any point.

UNIT IV THERMAL ANALYSIS 10

Thermal Analysis- Thermal Modelling Issues, Basic Thermal Analysis, Advanced Thermal Analysis. Understanding how to calculate monthly heat loads and hourly temperature graphs for any zone.

UNIT V INTEGRATED PASSIVE ENERGY STRATEGIES 15

Cognitive, analytical and simulated modeling and design of buildings. zero net energy (ZNE) building-Traditional buildings-electrical grid - HVAC and lighting-Net Zero Energy Building -Case studies.

TOTAL: 60 PERIODS

COURSE OUTCOMES

CO1	Knowledge and ability to use predictive Modelling techniques for assessing the energy performance through different software.
CO2	Understanding of how to calculate the percentage of shade and incident solar radiation on any surface.
CO3	Knowledge how to compute hourly temperature graphs and monthly heat loads for any zone to achieve thermal comfort.
CO4	understanding of building simulation modelling and design

REFERENCES

1. Clarke, Joseph; "Energy Simulation in Building Design", Second Edition Butterworth, 2001.
2. Energy Efficient Buildings in India,The Energy and Resources Institute, TERI, 2009.
3. Kabele, K., “Modeling and analyses of passive solar systems with computer simulation”, in Proc. Renewable energy sources, PP. 39 – 44, Czech Society for Energetics Kromeriz 1998.
4. Manual of the selected software – Ecotect Analysis 2011 ,TAS-version 9.2.1.6, etc
5. MoneefKrarti, Energy Audit of Building Systems- CRC Press, 2000 ESRU,. Building Energy Simulation Environment; User Guide Version 9 Series. “ESRU Manual U 96/1, University of Strathclyde, Energy Systems Research Unit, Glasgow, 1996.
6. Voss, Karsten; Musall, Eike: "Net zero energy buildings - International projects of carbon neutrality in buildings", Munich, 2011.

CO – PO Mapping - PREDICTIVE BUILDING MODELLING SOFTWARE

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	**3**	-	-	-	**2**	-
CO2	-	-	-	**2**	**3**	-
CO3	-	-	-	**2**	-	-
CO4	-	-	-	-	-	**3**
AVERAGE	3/1=**3**	-	-	2+2 =4/2 =**2**	3+2 =5/2=**2.5**	3/1=**3**

EA4111 ENVIRONMENTAL DESIGN STUDIO - I L T P/S C
0 0 10 10

OBJECTIVES

- To enable design of small built-up spaces by taking into consideration of various climatic conditions and strategies of environmental design principles.

CONTENT

The building shall be designed to minimize energy use and operating costs without affecting the functionality, accommodation standards, occupant health, safety or comfort. Quantification of the results should be based on theoretical and mathematical principles. Manual quantification is essential for the following aspects.

- Microclimatic analysis - Bio climatic and psychometric analysis of comfort zone (based on eco charts, and graphs)
- Whole building Analysis for Energy performance, (based on heat gain and heat loss calculations etc.,)
- Indoor thermal comfort, (Solar Analysis for optimizing Orientation, Shading and shading analysis, TSI, Thermal neutrality, time lag, Decrement factor etc.,)
- Passive energy conservation measures (performance evaluation of passive strategies like, stack effect, thrombe wall, radiant cooling system etc.,) .
- Indoor lighting levels (based on Day light factor method, lumen method etc.,)
- Air quality analysis (IAQ)
- Analysis on Life cycle assessment/ Embodied energy and carbon foot print
- Site contour analysis, Net perforated area, annual run off calculations.

The project submission should be in the form of Drawings, calculations, models and reports.

TOTAL: 150 PERIODS

COURSE OUTCOME

CO1	To allow for the creation of compact built-up spaces while taking into account a variety of climatic variables and environmental design principles.
CO2	To allow for the investigation of the link between architectural form, material properties, and environmental performance.
CO3	To provide understanding of modelling tools and passive tactics for measuring the energy performance, environmental responsiveness
CO4	To provide insight on how this relationship should change in response to climate change and new technological capabilities.

REFERENCES

1. IS:3362-1977, Indian Standard, code of practice For Ventilation of Residential Building
2. Rea, M., 2000. *The Lighting Handbook*. 9th ed. Illuminating Engineering Society of North America, SP 41 (1987) Handbook On Functional Requirements Of Non-industrial Buildings (Lighting And Ventilation), BIS
3. Steven V szokolay, 2008, Introduction to architectural science. Taylor & Francis group,UK
4. Givoni Baruch, "Passive and Low Energy Cooling of Buildings", Van Nostrand Reinhold, New Yord, 1994

CO – PO Mapping - ENVIRONMENTAL DESIGN STUDIO – I

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**3**	**2**
CO2	**-**	**3**	**-**	**2**	**3**	**-**
CO3	**2**	**-**	**-**	**2**	**-**	**-**
CO4	**-**	**-**	**-**	**3**	**-**	**2**
AVERAGE	3+2 =5/2=**2.5**	3/1=**3**	**-**	3+2+2 =7/3=**2.3**	3+3 =6/2=**3**	2+2 =4/2=**2**

RM4251 RESEARCH METHODOLOGIES FOR BUILT 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 understand research in the specific domain of built 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 including research in the domain of built environment.

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 including research in the domain of built environment.

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 of competent research, from project inception to completion with a focus on research in the domain of built environment. Review of research publications.

TOTAL: 45 PERIODS

COURSE OUTCOME

CO1	Skill to identify, decipher and interpret issues relating to architecture based on research enquiry methods.
CO2	Knowledge of different methods of conducting research and research writing.
CO3	Familiarity with specific research related to built environment.

REFERENCES

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

CO – PO Mapping - RESEARCH METHODOLOGIES FOR BUILT ENVIRONMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**2**	**-**	**2**
CO2	**2**	**-**	**-**	**2**	**-**	**2**
CO3	**-**	**-**	**-**	**-**	**-**	**3**
AVERAGE	3+2 =5/2=**2.5**	**-**	**-**	2+2 =4/2=**2**	**-**	2+2 +3=7/2=**2.3**

EA4201 ENVIRONMENTAL DISTURBANCES, POLLUTION AND REMEDIES

L	T	P/S	C
3	0	0	3

OBJECTIVES:

- To provide knowledge related to the broad field of environmental disturbances, and tools that can be used in various remedies.
- Introducing the options of renewable resources and appropriate technologies for harnessing them for our benefit.
- To improve environment protection, these technologies are gaining importance in our day-to-day applicative lifestyle.

UNIT I INTRODUCTION 09

Definition and classification of environmental disturbances – physical, chemical, biological, aesthetic, socio economic factors, natural and man-made, Environmental disturbances at local and global level.

UNIT II UNIT, MEASUREMENTS AND STANDARDS 09

Air, Water, Solid waste, and Noise pollution – Basic parameters, units, sampling, legal standards, measurements and limits. Environmental planning standards.

UNIT III REMEDIAL TECHNIQUES AND DISTURBANCE- BUILT ENVIRONMENT 09

Reducing the impact of pollution through chemical, biological & physical remediation techniques. Energy & emission generation from building materials throughout its life cycle analysis.

Energy balance of human and built environment -Thermal Environment, Aqueous environment. Environmental impact of building materials, Eco friendly materials, their composition, production and recycling, physical properties etc. Embodied energy /Operational energy of materials like steel, fly ash bricks, gypsum, eco-boards etc. Lifecycle assessment of materials.

UNIT IV POLLUTION AND REMEDIES 09

Structure and composition of Atmosphere –Definition, Scope and Scales of Air, Water and Land Pollution –Sources and classification of air pollutants and their effect on human health. Control and preventive measures –Contaminated soil characterization and containment – Sources of water pollution and treatment methods. ICZM and sustainable Development.

UNIT V ECOLOGICALLY DISTURBED SITES AND RESTORATION 09

Ecologically sensitive areas -Restoration ecology -Disturbances caused by built structures – from 'cradle to grave' –Remedial measures applicable-Fragmentation- Landscape Ecology.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understanding the factors leading to environmental disturbance and the correctives and preventives to avoid the same.
CO2	knowledge about legal standards of environmental planning
CO3	Understanding the need for a balanced energy use between people and the built environment
CO4	Understanding of ecological restoration and corrective actions

REFERENCES:

1. David Lee Smith, Environmental Issues for Architecture, Wiley; 1 edition, 2011.
2. Larry W Canter, Environmental Impact Assessment (Hard cover), McGraw-Hill Education, 1996
3. Mritunjoy Sengupta, Environmental Impacts of Mining Monitoring, Restoration, and Control, CRC Press; 1 edition, 1993
4. P.K. Gupta , Methods in Environmental Analysis, Agro bios, 2011
5. Scott Drake, The Elements of Architecture - Principles of Environmental Performance in Buildings, 2009, Routledge, 2009.

CO – PO Mapping - ENVIRONMENTAL DISTURBANCES, POLLUTION AND REMEDIES

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**-**	**-**	**-**	**-**	**-**	**2**
CO2	**2**	**-**	**-**	**-**	**2**	**2**
CO3	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**2**	**-**	**-**	**-**	**3**	**-**
AVERAGE	2+2 =4/2=**2**	**-**	**-**	3/1=**3**	2+3 =5/2=**2.5**	2+2 =4/2=**2**

EA4202	SUSTAINABLE, ENERGY EFFICIENT BUILDING MATERIALS AND TECHNOLOGIES	L	T	P/S	C
		3	0	0	3

OBJECTIVES:

- To Understand the concept of Energy efficiency
- An insight into various Energy Efficient Materials and Sustainable Construction Technology

UNIT INTRODUCTION ON ENERGY EFFICIENCY 09

Energy Efficiency – Energy Conservation – Recourse Consumption – Introduction – Distribution of Energy use in India – Factors affecting the Energy use in Buildings – Pre Building Stage, Construction Stage & Post Occupancy stages – Concept of Embodied Energy – Energy needs in Production of Materials – Transportation Energy – Concept of light footprint on Environment

UNIT II RECYCLABLE AND RENEWABLE MATERIALS 09

Concept of Recyclable materials – Sustainable Building Materials – Life Cycle Design of Materials – Biodegradable & Non-Biodegradable Materials – Green rating and Building Materials – LEED and other Green rating Systems – Concept of Resource rescue, Recycled content, Regional materials, Rapidly renewable materials – Fly ash bricks, Cement – Recycled Steel, Bamboo based products

UNIT III PASSIVE DESIGN IN MATERIALS 09

Passive Design and Material Choice – Traditional Building Materials – Importance of envelope material in internal temperature control – Specification for walls and roofs in different climate – Material and Humidity Control

UNIT IV SUSTAINABLE CONSTRUCTION 09

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 - portable architecture.

UNIT V ENERGY EFFICIENT TECHNOLOGIES 09

Energy Efficient Construction Technology – Filler Slab – Rat trap Bond – Technologies developed by CBRI – Traditional Building Construction Technologies – Introduction to other Technological interventions to save Energy – Intelligent Buildings – Energy Conservation through Technological intervention – Saving Energy used f or lighting by design innovation – Case studies

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	An understanding on sustainability as applicable to architecture.
CO2	Knowledge about traditional energy-saving construction methods.
CO3	To understand the properties of materials and applications in appropriate usage.
CO4	Ability to critically analyses buildings with respect to sustainability.

REFERENCES:

1. Bansal Naveendra K., Hauser Gerd and Minke Gernot, “Passive Buildings Designs :Handbook of Natural Climatic Control”, Elsevier Science, Amsterdam 1997.
2. Givonji B., “Man, Climate and Architecture”, Elsevier, Amsterdam, 1986
3. Koenigsberger O.H, T.G. Inger Soll, “Manual of tropical Housing and Building”longmanGroup United Kingdom, 2012.
4. Watson Donald, ‘Climatic Design: Energy Efficient Building Principles & Practices”, Mc GrawHill Book company, New York, 1993.

CO – PO Mapping - SUSTAINABLE, ENERGY EFFICIENT BUILDING MATERIALS AND TECHNOLOGIES

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	-	3	-	2
CO2	2	-	-	-	3	2
CO3	2	3	-	-	-	-
CO4	-	-	-	3	-	2
AVERAGE	3+2+2 =7/3=**2.3**	3/1=**3**	-	3+3 =6/2=**3**	3/1=**3**	2+2+2 =6/3=**2**

MH4221 GEOGRAPHICAL INFORMATION SYSTEMS FOR BUILT ENVIRONMENT **L T P/S C 1 0 3 4**

OBJECTIVES

- To introduce role of GIS in
- To give basic familiarity with the concepts, tools and techniques of GIS
- To give training in the application of GIS for built environment.

UNIT I INTRODUCTION TO G.I.S **9**

Introduction to Geographical Information System (GIS). Defining the objectives of GIS in problems related to the macro environment. Outline of commercial and open source GIS software and introduction to basic components of GIS software. Outline of Spatial and non-spatial data. Understanding of Projection and Coordinate systems. Preparation of map with appropriate format for specific purposes.

UNIT II SPATIAL AND ATTRIBUTE DATA INPUT **18**

Passive and Active Remote Sensing, Image Processing – Spectral Signature Curve, GPS, Aerial Photograph, Satellite Imagery, LIDAR and Drones. Identification of required spatial data layers. Coding schemes. National Urban Information System. Digitization of spatial data. Editing. Geo-referencing of Satellite Imagery, Cadastral Map, Role of attribute data in defining geographic features. Adding attribute data file. Topology generation. Joining attribute data to its geographic features

UNIT III SPATIAL ANALYSIS USING GIS **18**

Generation of 3-D Model in GIS. Performing overlay functions. Manipulating attribute data. Preparation of Existing Land use. Map and report generation. Network Analysis.

UNIT IV MODELLING THE MACRO ENVIRONMENT **15**

Need for modelling the macro environment for different scales and purposes. Modelling for suitability/ projects/ situations/ problems in the realm of landscape design, urban design, urban and environmental planning.

TOTAL: 60 PERIODS

COURSE OUTCOMES

CO1	Awareness of GIS and the context of its use for different purposes.
CO2	Knowledge of concepts, techniques, methods of GIS.
CO3	Ability to apply GIS for specific situations/ realms involving the built environment.

REFERENCES

1. Arthur. H. Robinson et al., 'Elements of Cartography', John Wiley & Sons, New York, 1995.
2. Judith. A. Tyner, ' Principles of Map Design', The Guilford Press, New York, 2010.
3. Ramesh Elmasri and Shamkant.B.Navate, 'Fundamentals of Database Systems', Pearson Education Limited, USA, 2010.
4. Anji Reddy.M., 'Text book of Remote Sensing and Geographical Information Systems', B.S. Publications, Hyderabad, 2008.
5. Michael Law and Amy Collins, 'Getting to know ArcGIS Pro', ESRI Press, USA, 2016.
6. Paul. D. Zwick and Margaret.H. Carr, 'Smart Land-use Analysis: The LUCIS Model', ESRI Press, USA, 2007.
7. David Maquire, Michael Batty and Michael F.Goodchild, 'GIS,Spatial Analysis and Modeling', ESRI Press, 2005.
8. Cynthia A. Brewer, 'Designing Better Maps: A Guide for GIS Users' – 2nd Edition, ESRI Press, 2015.

CO – PO Mapping - GEOGRAPHICAL INFORMATION SYSTEMS FOR BUILT ENVIRONMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	**3**	-	-	-	**2**	-
CO2	-	-	-	**3**	**2**	-
CO3	-	-	**3**	-	-	-
AVERAGE	3/1=**3**	-	3/1=**3**	3/1=**3**	2+2 =4/2=**2**	-

EA4211 **ENVIRONMENTAL DESIGN STUDIO – II** **L T P/S C**
0 0 10 10

OBJECTIVES:

- Detailed theoretical study of Global, Macro and Micro level Climate – Elements of climate and its qualification – Earth energy balance – Climatic data and its interpretation – Energy balance of human and built Environment – Thermal Environment – Adaptive model of thermal comfort and its application to sustainable design of building – Design of any type of building – hotel / commercial buildings, etc. – with the above principles.

The detailed scope of the design project is not limited to the following

Whole building Analysis for Energy performance, Climatic Comfort & ECBC Compliance

1. Solar Analysis for optimizing Orientation, Shading and glazing areas
2. Detailed whole building thermal / Energy Simulation to achieve thermal comfort indoors through detailed analysis.
3. GRIHA/LEED related analysis and further bio climatic considerations:

Building Analysis for Day lighting and artificial Lighting

1. Day lighting simulation for optimizing natural lighting
2. Luminance Analysis

Natural ventilation and Indoor air quality

1. CFD analysis for exterior and interior wind movements (Comparison with bio-climatic chart)
2. Indoor air quality and air change analysis

Site Planning & Water Management

1. Design and recommendation for erosion control & sedimentation control on site.
2. Assist on Low water Usage, Rainwater Harvesting, wastewater recycling and construction waste usage and other waste management strategies
3. Transportation Management Strategies
4. Embodied energy calculations using online simulation tools
5. Carbon foot print analysis using online simulation tools

The project submission should be in the form of drawings, models and reports.

TOTAL: 150 PERIODS

COURSE OUTCOMES:

CO1	An ability to design a building or a group of buildings with all the due considerations of sustainable planning and design principles.
CO2	Ability to use energy simulation tools and its result analysis
CO3	To balance human needs with environmental concerns in architectural design.
CO4	Ability to critically analyses buildings with respect to Bio-climatic and GRIHA/LEED related.

REFERENCES:

1. Givoni Baruch, "Passive and Low Energy Cooling of Buildings", Van Nostrand Reinhold, New Yord, 1994
2. **Steven V szokolay,**2008, *Introduction to architectural science*. Taylor & Francis group,UK
3. https://www.designbuilder.co.uk
4. https://www.iesve.com/

CO – PO Mapping - ENVIRONMENTAL DESIGN STUDIO – II

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**2**	**-**	**2**
CO2	**-**	**-**	**-**	**3**	**-**	**2**
CO3	**-**	**-**	**2**	**-**	**3**	**-**
CO4	**-**	**-**	**-**	**-**	**3**	**3**
AVERAGE	3/1=**3**	**-**	2/1=2	2+3 =5/2=**2.5**	3+3 =6/2=**3**	2+2 =4/2=**2**

EA4301 LIFE CYCLE ASSESSMENT OF BUILDINGS L T P/S C
3 0 0 3

OBJECTIVES:

- To enable an understanding of life-cycle analysis as a means to achieving sustainable buildings and the various tools to assess the same

UNIT I INTRODUCTION AND TERMINOLOGY 08

History of LCA, Aspects of LCA, variants of LCA, Life cycle stages, end of life, Functional unit, System boundary, Life Cycle Inventory (LCI) data base, Life Cycle Management (LCM), Life Cycle Energy Analysis (LCEA), Carbon Accounting.

UNIT II LIFE CYCLE ASSESSMENT IN BUILDING INDUSTRY 07

Material level, Product Level, building level, Industry level, LCA and Design process, Pre-design, Schematic Design and Design Development Stage.LCA process and impact categories: Inventory Analysis, Impact assessment, interpretation, Different impact categories like Global Warming Potential (GWP), Acidification Potential (AP), Eutrophication Potential (EP), Smog Formation Potential, Fossil fuel and Ozone Depletion Potential.

UNIT III DIFFERENT TOOLS FOR LCA 12

Configuration of a tool, Classification of tools, Impact estimator and eco-calculator, Building for Economic and Environmental Sustainability (BEES), International LCA Tools, Related tools, Green footsteps & eco-friendly applications. Guidelines to integrate: LCA with design and evaluation, Different Scenarios of use of LCA, Sustainability targets, Selection of a LCA tools, LCIA

UNIT IV GREEN BUILDING MATERIALS SELECTION 09

Figure of Merit (FOM), Parameter selection for FOM, Selection based on FOM, Building into components-three phase building breaking down a materials, Criteria for material selection

UNIT V LIFE CYCLE COSTING (LCC) TOOL 09

Component characteristics of an element group, Input for energy Calculation, LCC calculations conduct of LCI and LCC calculations, Slective Assessment, Normalization and Weighing Factors LCA and LCC for different materials. Case studies- Two and Three variants of a house, office building, retrofitting buildings

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understand all aspects of Life Cycle analysis of a building.
CO2	To be able to analyze building Life Cycle with respect to sustainability.
CO3	Understanding the criteria for selecting building materials
CO4	Ability to critically analyses buildings with respect to Bio-climatic and GRIHA/LEED related.

REFERENCES:

1. A. Kapur and T.E. Graedel: Industrial Ecology. Encyclopedia of Energy, Volume 3, 2004.
2. Environmental life cycle analysis by David Ciambrone, CRC-Press 1997.
3. Life-cycle analysis of energy systems from methodology to applications, by Bent Sorensen, Published by Royal Society of Chemistry, June 2011.
4. Lifecycle Assessment: Principles and Practice Chapter 1.
5. R. A. Frosch and N. E. Gallopoulos: Strategies for Manufacturing, Scientific American 261 (3), 144-152 1989.

CO – PO Mapping - LIFE CYCLE ASSESSMENT OF BUILDINGS

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**-**	**2**	**-**	**-**	**3**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**-**
CO3	**3**	**-**	**-**	**2**	**-**	**-**
CO4	**-**	**-**	**-**	**-**	**2**	**3**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	3+2 =5/2=**2.5**	3/1=**3**

EA4302 ENVIRONMENTAL LAWS AND MANAGEMENT L T P/S C
3 0 0 3

OBJECTIVES:

- An Understanding of various Environmental Laws and Protection
- To expose the students to the concepts of Environmental Ecology, Accounting and Management

UNIT I ENVIRONMENTAL LAW AND POLICY 09

Constitutional Provisions for Environmental Protection: Specific Provisions for Environmental Protection in the Constitution of India, Provisions in the Directive Principles of State Policy - Environmental Acts, Rules and Notifications - Water (Prevention & Control of Pollution) Act - Water (Prevention & Control of Pollution) Cess Act - Air (Prevention & Control of Pollution) Act and the corresponding Rules- Environment (Protection) Act and Rule - Hazardous Waste (Management & Handling) Rules - Manufacture, Storage and Import of Hazardous Chemicals Rules - Public Liability Insurance Act and Rule. International Law on Environmental Protection.

UNIT II INDUSTRIAL ECOLOGY 09

Definitions- Fundamentals of Ecology- Metaphor - Food Webs and Industrial Eco Parks- Generation and Evaluation of Alternatives-Decision Methods-Life Cycle Assessment (LCA); Components - Goals - Definition and Scope - Industrial Metabolism - Anthropogenic Vs Natural Fluxes of Toxic Heavy Metals-Industrial Law in Environmental Protection- Mitigation and Environmental Management Plan

UNIT III ENVIRONMENTAL PLANNING AND DECISION MAKING 09

Environmental Concepts – Sustainability and Environmental Carrying Capacity - Strategies in Land use, Transportation, Infrastructure Planning and Management - Generation and Evaluation of Alternatives -Decision Methods-Mitigation and Environmental Management Plan - Public Participation in the Process of Environmental Decision-Making Process

UNIT IV INTRODUCTION TO ENVIRONMENTAL ACCOUNTING 09

Defining Environmental Costs - Managing Environmental Costs - Identifying Environmental Costs - Controlling Environmental Costs (Waste and Effluent Disposal- Water Consumption - Energy - Transport and Travel Consumables and Raw Materials)- Accounting for Environmental Costs – Environmental Audit- Input/Outflow Analysis.

UNIT V ENVIRONMENTAL MANAGEMENT 09

Environmental Protection Act 1986-Coastal Zone Regulations, Hill Area Conservation, Forest Conservation Act- Components of Environment – Classification of Environmental Resources - Purpose and Objectives in Environmental Protection, and Management – Institutional and Legal Support in management of the Environment-Environmental Policies, and Protocols-Global Environmental Initiatives- Environmental Indicators - Concepts and Measures in Environmental Standards - Environmental Management Options

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understand Environmental laws in the Indian Context.
CO2	Identifying the role that industrial law plays in environmental protection
CO3	Understand specific Environmental laws in special areas such a hilly area, coastal areas etc
CO4	Ability to analyze the Global Environmental Initiative for environmental resource protection

REFERENCES:

1. Christian Ndubisi Madu, 'Environmental Planning And Management', Imperial College Press Business & Economics, 2007.
2. John Randolph, 'Environmental Land Use Planning and Management', Island Press, Architecture, 2004.

3. Narasimha Murthy D.B., 'Environmental Planning and Management' Deep and Deep Publications, Environmental policy, 2005.
4. P. Leelakrishnan , Environmental Law in India, Butterworths Wadhwa; 3rd edition, 2008
5. Trivedy R. K- Handbook of Environmental Laws, Guidelines, Compliance & Standards, Vol. 1 & 2 Environ – Media karad, India, 2010.

CO – PO Mapping - ENVIRONMENTAL LAWS AND MANAGEMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	-	2	-	-	3	-
CO2	-	-	3	-	-	-
CO3	3	-	-	-	-	-
CO4	-	-	-	-	2	3
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	-	3+2 =5/2=**2.5**	3/1=**3**

EA4311 **DISSERTATION** **L T P/S C**
0 0 4 4

OBJECTIVES:

- To expose the students to the various thrust areas in environmental architecture.
- To inculcate the spirit of research in environmental architecture by providing opportunities to read on various issues.
- To expose the students to the finer details of technical writing.
- To provide a platform for a prelude to the 'Design Thesis'

Dissertation is best expressed as 'Design in text'. It offers an opportunity to look at the research component in architecture in various thrust areas such as history, theory, design and other value-based aspects through texts.

Students are encouraged to choose any topic of their interest. This may range from analyzing and a critique of the works of an architect, ideologies and philosophies of architects that get transformed spatially, history, typological architecture, sustainability issues and so on the Dissertation must comprise of an aim, the objectives, the scope and limitations of their dissertation, hypothesis (if any), methodology followed by extensive review of literature through references and documentation.

The analysis of the work must be substantiated either empirically or through extensive arguments.

A dissertation could also be a thesis preparation course and gives the student scope for independent study and opportunity to explore specific area of interest which will form the basis of his/ her design thesis project in the next semester.

The topic will have to be approved at the start of the semester and reviewed periodically to a jury at the end of the semester.

TOTAL: 60 PERIODS

COURSE OUTCOMES:

CO1	An understanding leading to formation of thesis ideas.
CO2	To allow students to do the more intricate elements of technical writing.
CO3	Ability to explain research procedures and approaches and how they relate to environmental architecture.
CO4	To provide insight on how linkages between climate change and emerging trends

REFERENCES:

1. Iain Borden and Kaaterina Ruedi; The Dissertation: An Architecture Student's Handbook; Architectural Press; 2000.
2. John W Creswell; Research design: Qualitative, Quantitative and Mixed Methods Approaches; Sage Publications; 2002.
3. Linda Grant and David Wang, Architectural Research Methods, John Wiley Sons
4. Ranjith Kumar; Research Methodology- A step by step guide for beginners; Sage Publications; 2005
5. Wayne C Booth; Joseph M Williams; Gregory G. Colomb; The Craft of Research, 2nd Edition; Chicago guides to writing, editing and publishing, University of Chicago Press, 2003.

CO – PO Mapping - DISSERTATION

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**3**	**-**	**2**
CO2	**3**	**-**	**-**	**-**	**-**	**2**
CO3	**-**	**-**	**-**	**3**	**-**	**-**
CO4	**-**	**3**	**-**	**-**	**-**	**3**
AVERAGE	3+3 =6/2=**3**	3/1=**3**	**-**	3+3 =6/2=**3**	**-**	2+2+3 =7/2=**2.3**

EA4312 **ENVIRONMENTAL DESIGN STUDIO- III** **L T P/S C**
0 0 10 10

OBJECTIVES:

- To develop creative skills, abilities, judgment and control in the design of built environment.
- The student should be able to have a whole building design approach for energy efficiency.

<u>The detailed scope of the design project is not limited to the following</u>

- Designing eco house, green roofs and walls, building with environmentally friendly technologies, sustainable landscape design, green cities. Conserving traditional buildings for sustainability.
- Designing to mitigate climate change. Building design through simulation.
- Design through biological and ecological principles.
- Design/Retrofitting of buildings/campuses for energy efficiency.
- Focus should be on buildings/campuses which are conventionally energy guzzlers.
- The project submission should be in the form of drawings, models and reports

TOTAL: 150 PERIODS

COURSE OUTCOMES:

CO1	Design buildings which are ecologically sensitive considering all traditional and contemporary principles and practices of sustainability.
CO2	To balance human needs with environmental concerns in architectural design.
CO3	Ability to use energy simulation tools and its result analysis
CO4	Ability to Understand the process of building retrofitting for energy efficiency

REFERENCES:

1. Steven V Szokolay. Introduction to Architectural Science: The Basics of Sustainable Design. Architectural Press, Second Edition. 2010.
2. Vishal Garg, Jyothirmay Mathur, SurekhaTetali, Aviruch Bhatia. Building Energy Simulation: A workbook using Design Builder. CRC Press. 2017
3. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press
4. ISHRAE IEQ Standard. 2017
5. Jens Lausts. Energy Efficiency Requirements in Building Codes, Energy Efficiency Policies for New Buildings. International Energy Agency (IEA) Information paper. March 2008
6. Reddy T.A., et al. Heating and Cooling of Buildings: Principles and Practice of Energy Efficient Design, Third Edition, CRC Press

CO -PO Mapping – ENVIRONMNETAL DESIGN STUDIO –III

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**2**	**-**	**2**
CO2	**-**	**-**	**-**	**3**	**-**	**2**
CO3	**-**	**-**	**2**	**-**	**3**	**-**
CO4	**-**	**-**	**-**	**-**	**3**	**3**
AVERAGE	3/1=**3**	**-**	2/1=**2**	2+3 =5/2=**2.5**	3+3 =6/2=**3**	2+2+3 =73=**2.3**

EA4313 **INTERNSHIP TRAINING** **L T P/S C**
0 0 0 2

OBJECTIVES

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

CONTENT

- The students will undertake the Internship Training in any organization engaged in activities relating to a specialized area of architecture for a period of 4 weeks.
- The Internship Training is expected to make aware how 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 organization/ 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 utilize 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.

COURSE OUTCOME:

CO1	Exposure in and enrichment with respect to specific areas of architecture for pursuing practice or independent research
CO2	Facilitating communication with associated professionals, groups engaged in research
CO3	Ability to deeply comprehend how something works in practice

CO-PO Mapping - INTERNSHIP TRAINING

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**2**	**-**	**2**
CO2	**2**	**-**	**-**	**-**	**2**	**2**
CO3	**-**	**-**	**-**	**-**	**3**	**-**
AVERAGE	3+2 =5/2=**2.5**	**-**	**-**	2/1=**2**	2+3 =5/2=**2.5**	2+2 =4/2=**2**

EA4411 **THESIS PROJECT** **L T P/S C**

0 0 20 20

OBJECTIVES:

- To integrate the knowledge gained in the previous semesters with respect to issues/tools of architectural design at a more advanced level.
- To understand and identify issues appropriate to a particular project or area of architecture, through independent thinking as well as to design in a manner appropriate to the project context.

CONTENT

- The students will synthesize 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 project would desirably extend the critical position developed within the theory and studio projects as well as dissertation. The scale of the project could extend from individual site to settlement levels.
- The initial process shall be rigorous, incorporating background research on the topic, case

studies, documentation of project issues, context, site and building information, programming.

- The process would culminate in design interventions at scales appropriate to the topic. The project shall desirably have the potential to serve as a starting point for practice and/ or further research.
- Students will submit a detailed proposal on their topic of interest(s). The Proposal shall be approved by the thesis review committee. The thesis project will be reviewed periodically by the review committee. At the end of the semester, the final thesis will be submitted and presented through a viva voce examination before a jury.

TOTAL: 300 PERIODS

COURSE OUTCOMES:

CO1	Students would be able to use numerous modern and conventional sustainability strategies into the architectural design process.
CO2	Students would be able to recognise, delve deeply into, and reflect on specific and suitable environmental concerns in the field of design.
CO3	Student would be able to integrate the knowledge learned in the course with more complex architectural design tools and concerns.

CO-PO Mapping - THESIS PROJECT

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**3**	**-**
CO2	**2**	**-**	**-**	**3**	**2**	**3**
CO3	**-**	**-**	**-**	**2**	**-**	**3**
AVERAGE	3+2 =5/2=**2.5**	**-**	**-**	3+2 =5/2=**2.5**	3+2 =5/2=**2.5**	3+3 =6/2=**3**

EA4001 SUSTAINABILITY AND ENERGY CONSERVATION IN LANDSCAPE ARCHITECTURE **L T P/S C**
3 0 0 3

OBJECTIVES:

- To expose the students on the issues of sustainability at the global level.
- To Focus on the energy conservation landscape and sustainability at the micro level.
- Sustainable landscape design for various climates of India

UNIT I INTRODUCTION TO SUSTAINABILITY 10

Need and concept of sustainability, Brundtland report, World Commission on environment and development, sustainable development, sustainable growth, sustainable economy and sustainable use. Visions of sustainability. Source and ethics of sustainability. Sustainability and Climate Change.

UNIT II SUSTAINABLE SITE 07

Sustainable site – LEEDS, BREAM, rating erosion and sedimentation control, site selection, urban development, landscape and exterior design etc., Green Building in the context of sustainability. Ecology and sustainability. Eco-City.

UNIT III INTRODUCTION TO ENERGY CONSERVATION IN LANDSCAPE 09

Energy conservation and sustainability, principles of energy systems, energy and global environment, scope for energy conservation in landscape.

UNIT IV ENERGY CONSERVATION METHODS IN LANDSCAPE ARCHITECTURE-CASE STUDIES 10

Various methods of energy conservation in landscape architecture, energy conservation techniques in various climates- hot and humid, hot dry, etc. Energy efficient site planning and landscape development. Energy efficient planting design.

UNIT V SUSTAINABLE LANDSCAPE PRACTICES 09

Sustainable landscape maintenance and management, Sustainable planning and city form. Sustainable urban landscape, landscape sustainability at the national and regional level.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understanding the concept of sustainability from macro to micro level.
CO2	A comprehension of energy conservation landscape in relation to site planning and other functional space typologies.
CO3	Understanding the impact that landscape design plays in varying outdoor surroundings both on a micro and macro scale, in terms of sustainability and ecological
CO4	Ability to adopt sustainable landscape techniques at the urban level

REFERENCES:

1. Anne simon Moffat and marc schiler, Landscape design that saves energy, Williammonow and co.,Inc., New york, 1981.
2. Grady Clay, Water and the landscape McGraw-Hill Inc.,US; First Edition edition 1979)
3. John.F.Benson and Maggie.H.Roe, Landscape and sustainability, John Wiley Publication, New york, 2000.
4. O.R.Gray, Landscape Planning for energy conservation, Van Nostrand Reinhold, 1983.
5. Publications of Centre for Science and Environments, New Delhi and TERI.

CO -PO Mapping - SUSTAINABILITY AND ENERGY CONSERVATION IN LANDSCAPE ARCHITECTURE

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**2**
CO3	**-**	**3**	**-**	**-**	**-**	**2**
CO4	**-**	**-**	**3**	**-**	**3**	**-**
AVERSGE	3/1=**3**	3/1=**3**	3+3 =6/2=**3**	**-**	2+3 =5/2=**2.5**	2+2 =4/2=**2**

EA4002 ENVIRONMENT INFRASTRUCTURE L T P/S C
3 0 0 3

OBJECTIVES:

- The main objective of this course is designed to provide a general understanding of various issues and approaches to planning, designing, and maintenance of Infrastructure. The major emphasis in this course will be on water supply, sewerage, storm water drainage and solid water management.

UNIT I INTRODUCTION 09

Concepts of basic needs, formation of objectives and standards. Data requirements for programme planning of urban networks and service; feasibility planning studies for structure the infrastructure systems.

UNIT II WATER SUPPLY 09

Planning water supply; resource analysis quality of water system design; technological choices of alternatives – Issues related to the choice of centralized city water supply versus decentralized systems

UNIT III STROM WATER MANAGEMNT 09

Sewerage and Storm Water Drains (Need Assessment in the context of Urbanization, Planning Considerations and Norms, Basic Design Parameters and Appurtenances). Waste generation process in cities

UNIT IV WASTE WATER MANAGEMENT 09

Waste water disposal systems including storm water drainage, system designs, nodal facilities, technological and environmental considerations. Issues related to hydrological and geographical and development parameters – eutrophication. Biological concepts in environmental sanitation

UNIT V SOLID WASTE MANAGEMENT 09

Sanitation technologies, their relevance to incremental growth of urban areas. Low-cost sanitation technologies and concepts as related to Indian and third world country contexts Sewage Treatment Plant and Water Treatment Plant (Components, Planning Considerations, Basic Design Parameters).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Knowledge of feasibility assessments for planning the infrastructure systems.
CO2	Ability to conceptually plan/ design waste management in simple context.
CO3	Understanding the impact biological concepts in environmental sanitation
CO4	Understanding sanitation technologies and how they relate to the gradual expansion in urban areas

REFERENCES:

1. G.M. Fair, J.C. Geyer and D.Okin, 'Water and Waste water engineering Volume II', John Wiley & Sons, Inc. New York, 1968.
2. 'Manual of Water Supply and Treatment', second edition, CPHEEO, Ministry of works and housing, New Delhi, 1977
3. AFE Wise, JA Swaffied Water, 'Sanitary & Waste Services in buildings', V Edition, Mitchell Publishing, Co. Ltd., 2002.
4. Arceivala S.J., 'Waste Water Treatment for Pollution Control', Tata McGraw Hill, 2008.
5. 'Renewable Energy, Basics and Technology, Supplement Volume on Integrated energy systems', Solar Agni systems, Sri Aurobindo Ashram, Pondicherry 605002.

CO- PO Mapping - ENVIRONMENT INFRASTRUCTURE

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**2**
CO3	**-**	**3**	**-**	**-**	**-**	**2**
CO4	**-**	**-**	**3**	**-**	**3**	**-**
AVERAGE	3/1=**3**	3/1=**3**	3+3 =6/2=**3**		2+3 =5/2=**2.5**	2+2 =4/2=**2**

EA4003 BUILDING SCIENCE AND SUSTAINABLITY L T P/S C
3 0 0 3

OBJECTIVES:

- To expose the students to the applications of smart materials and nanotechnology in the building industry to achieve sustainability.

UNIT I INTRODUCTION 08

Heat transfer processes in buildings. Thermal conductivity, resistance, transmittance, surface characteristics, surface coefficient, heat capacity, insulation.

UNIT II BUILDING SYSTEMS 10

Lighting – day lighting; ventilation – natural ventilation; indoor air quality; heating/cooling - geothermal; passive and active systems for energy production and conservation; water conservation – grey water reuse, water saving plumbing fixtures

UNIT III ECO HOUSE 07

The form of the house: the building as an analogy- design from first principles: conserving energy; working with climate: passive solar design; minimizing new resources; respect for users; respect for site and holism- photovoltaics and solar hot water systems; water usage; Case studies- design of eco houses: context specific.

UNIT IV BUILDING ENERGY 10

Calculation of principle building energy gains and losses. Estimation of building energy performance for heating and cooling for different climatic contexts

UNIT V GREEN CONSTRUCTION AND ENVIRONMENTAL QUALITY 10

Sustainable architecture and Green Building: definition- Green building Evaluation Systems; LEED Certification and GRIHA; Green Globe Certification; Case studies which look at the environmental approach- renewable energy- controlling the water cycle- impact of materials on the environment – optimizing construction- site management- environmental management of buildings.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Knowledge of heat flow through building envelope.
CO2	Ability to understand the passive and active system of built environment
CO3	Ability to calculate energy performance of heating and cooling load of building.
CO4	Understanding of the effects of building materials and environmental management.

REFERENCES:

1. Baird, George The architectural expression of environmental control systems 2001.
2. Faber, Oscar and Kell, J.R. Heating and air-conditioning of buildings. 2002.
3. Thomas, Randall & Fordham Max Sustainable urban design:an environmental approach" 2003.
4. Edwards, Brian and Hyett, Paul Rough guide to sustainability 2001.
5. Langston, Craig A. and Ding, Grace Sustainable practices in the built environment 2001.
6. Givoni Baruch,"Passive and Low Energy Cooling of Buildings",VNR, NewYorK, 1994.
7. Martin J Gainsborough, Radford and Helen Bennets, T J Williamson, "Understanding Sustainable architecture", Spon Press, London, 2003.

CO-PO Mapping – BUILDING SCIENCE AND SUSTAINABLITY

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**2**
CO3	**-**	**-**	**-**	**2**	**-**	**2**
CO4	**-**	**2**	**-**	**-**	**2**	**-**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	2+2 =4/2=**2**	2+2 =4/2=**2**

MH4071 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.

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 organizational Change and Progression. Challenges to sustainability and participation.

TOTAL: 45 PERIODS

COURSE OUTCOME

CO1	Understanding the principle of psychology in field of environmental Architecture
CO2	Ability to understand the linkage between form , space and attitude
CO3	Ability to evaluate whether a building is at a sufficient level
CO4	Knowledge of the changes and difficulties in participation and sustainability.

REFERENCES

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

CO -PO Mapping - ENVIRONMENTAL PSYCHOLOGY

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**-**	**2**
CO2	**-**	**-**	**-**	**3**	**-**	**-**
CO3	**-**	**3**	**-**	**-**	**-**	**2**
CO4	**-**	**-**	**3**	**-**	**-**	**-**
AVERAGE	3/1=**3**	3/1=**3**	3/1=**3**	3/1=**3**	**-**	2+2 =4/2=**2**

MH4073 **SOFT SKILLS** **L T P/S C**
2 0 1 3

OBJECTIVES

- To give introduction to the soft skills and personality
- To give understanding of and enable better interpersonal communication.
- To apprise of aspects of organisational communication and develop skill in it.
- To enable skill in reading and writing.

UNIT I INTRODUCTION TO SOFT SKILLS AND PERSONALITY 9

Introduction to Soft Skills. Understanding of self. Self-awareness, self- management and Self Development. Values. Attitude. Positive Thinking and optimism. Confidence and excellence. Developing perception. Patience, persistence and flexibility. Empathy and Emotional Intelligence. Types of stress and stress management. Time Management and overcoming procrastination. Career planning.

Exercises and case studies for the various topics.

UNIT II INTERPERSONAL COMMUNICATION 9

Classification and types of Communication. Verbal and non-verbal communication. Formal and informal communication. Barriers in communication.

Listening Skills, Types of Listening. Enhancing listening. Understanding context of words. Responding. Speaking. Self development through speaking.

Nonverbal Communication. Body language and etiquette. Proxemics. Understanding of cultural, social and economic diversity and adapting to others.

Exercises and case studies for the various topics.

UNIT III ORGANISATIONAL COMMUNICATION 12

Group Communication. Organisational Communication. Communication Breakdown. Conflict Management. Negotiation Skills. Meeting Management. Team Building and Team work. Leadership Skills. Emotional intelligence. Critical Thinking.

Speeches and debates, Combating nervousness and anxiety, Patterns and Methods of Presentation, Oral presentation- Planning and preparation, Making effective presentation. Speaking for various occasions at different scales. Public speaking. Group Discussions.

Exercises for the various topics.

UNIT IV ADVANCED READING AND WRITING SKILLS 15

Critical reading and understanding. Reviewing articles and books. Technical explanatory writing. Report writing for project. Structure of scientific/ technical papers. Writing papers for journals and conferences.

Assignments for the various topics.

TOTAL: 45 PERIODS

COUESE OUTCOME

CO1	Awareness of importance of soft skills.
CO2	Knowledge and skill in interpersonal communication.
CO3	Knowledge and skill in organisational communication.
CO4	Competency in reading and writing.

REFERENCES

1. Soft Skills, K.Alex, S.Chand, 2010
2. Soft Skills, Hariharan S, Sundararajan N, Shanmugapriya S.P, MJB Publishers 2010.
3. The ACE of Soft Skills, Gopalaswamy Ramesh, Mahadevan Ramesh, Pearson 2010.
4. Understanding Interpersonal Communication, Richard West and Lynn H.Turner, Cengage Learning, 2010.
5. Interpersonal Communication, Steven A. Beebe, Susan J. Beebe, Mark V. Redmond, Pearson 2011.

6. Business Correspondence & Report Writing, R. C. Sharma , Krishna Mohan,Tata McGraw Hill, 5th Edition 2017
7. How to Research and write a scientific paper, Robert A. Day, Barbara GasteCambridge University Press 2012.

CO-PO Mapping - SOFT SKILLS

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	-	2	-	2
CO2	2	-	-	2	-	2
CO3	-	-	-	-	-	3
CO4	-	-	2	-	-	-
AVERAGE	3+2 =5/2=**2.5**	-	2/1=**2**	3+2 =5/2=**2.5**	-	2+2+3 =7/3=**2.3**

EA4004 POST OCCUPANCY EVALUATION OF BUILDING L T P/S C
3 0 0 3

OBJECTIVES:

- To impart an understanding of an overview of energy consumption and its effects. Current energy consumption scenario in India. Need to reduce emissions.
- Aims and main aspects of energy management of buildings. Benefits and methodology for conducting the Historical Energy audit.
- Objectives & benefits and conducting Diagnostic Energy Audit. Instrumentation

UNIT I ENERGY MANAGEMENT 09

Energy management matrix as a tool to diagnose the current state of energy management in any given organization. Management issues covered in the matrix – energy policy, organization, motivation, information systems, Marketing & investment.

UNIT II ENERGY COMSUMPTION 09

Identification of opportunities for reducing energy consumption – improvements to the building. Determining the organizational profile. Monitoring & Targeting of energy use.

UNIT III BUILDING PHYSICAL DATA 09

Details of building energy survey – building information, building physical data, building envelope construction details, mechanical systems, electrical systems & equipment, hot water systems, indoor environmental conditions for each space, control systems and operating schedules.

UNIT IV ASSESSING BUILDING ENERGY 09

Assessing existing buildings on their energy use, environmental impact and occupant satisfaction. Building performance bench marks – rating and comparison of buildings. Techniques, methods & procedures of Post Occupancy Evaluation**.**

UNIT V BUILDING ENERGY EVALUATION 09

post occupancy evaluation of a building and document the relationship between building design, energy use, occupant satisfaction, environmental impact and report their observations**.**

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Awareness of importance of energy management matrix.
CO2	Knowledge and skill about control and operating systems.
CO3	Ability to understand techniques of building assessment
CO4	Understanding the linkages between design and energy usage

REFERENCES:

1. Moss J. Keith, "Energy Management and Operating Costs in Buildings", E & FN Spon, London, 1996.
2. O'Callaghan, Paul, W – "Buildings for Energy Conservation", Pergamon Press, London, 1980
3. Levermore Geoff, "Building Energy Management Systems", E&FN Spon, London, 2000.
4. Moncef Krarti, "Energy Audit of Building Systems: an Engineering approach" CRC Press, LLC, Florida 2000.
5. Albert Thulmann & William J Younger, "Handbook of Energy Audits", The Fairmont Press, 2003

CO-PO Mapping - POST OCCUPANCY EVALUATION OF BUILDING

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**2**
CO3	**-**	**-**	**-**	**2**	**-**	**2**
CO4	**-**	**2**	**-**	**-**	**2**	**-**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	2+2 =4/2=**2**	2+2 =4/2=**2**

EA4005 DESIGN OF ENERGY EFFICIENT AND HEALTHY BUILDINGS **L T P/S C 3 0 0 3**

OBJECTIVES:

- The main objective of this course is to have a holistic understanding of healthy buildings and the various preventives and technologies available to ensure healthy buildings.

UNIT I HEALTHY BUILDINGS THEORY 09

Performance of building services against standards, Work place standards of health, Observation and analysis of health risk in buildings, and maintenance requirements, Environmental and health impact of building materials.

UNIT II INVESTIGATIONS OF HEALTHY LIVING PRACTICES 09

Washing people, washing clothes, removing waste, improving nutrition, reducing crowding, separating people from animals, vermin or insects, reducing dust, controlling temperature and reducing trauma.

UNIT III DESIGN OF BASIC AIR CONDITIONING SYSTEM FOR BUILDINGS 09

Process of air conditioning system selection, heat load estimation, and design of air distribution. Air conditioning design for energy efficiency. A C system components : Fans, coils, filters and heat rejection equipment. Sick building syndrome, Issues of Indoor air quality.

UNIT IV FUNDAMENTAL PRINCIPLES OF FIRE SAFETY ENGINEERING 09

Fire safety in large modern buildings, fire detection and suppression systems. Design of manual and automatic water based systems to warn / extinguish fires. Alternatives to conventional prescriptive design.

UNIT V SOURCE AND NATURE OF HAZARDOUS WASTE 09

Impact on Environment – Hazardous Waste – Disposal of Hazardous Waste, Underground Storage Tanks Construction, Installation & Closure.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understanding methods to remove pollutants from indoor environment.
CO2	Knowledge and skill about energy efficient air-conditioning design.
CO3	Ability to understand techniques of fire safety systems in building design
CO4	Understanding the impacts of hazardous waste to environment

REFERENCES:

1. Abrams, D. W., "Low Energy Cooling: A Guide to the practical Application of Passive Coolingand Cooling Energy Conservation Measures", Van Nostrand Reinhold Co.,
2. Chadderton, D. V., "Air Conditioning: A practical Introduction", E & FN Spon, London
3. Chadderton, David, V., "Building Services Engineering", E & FN Spon.
4. K.M.Hangos and I.T.Cameron, "Process Modeling and Model Analysis", Academic Press, 2001
5. Stoecker, W. F., "Refrigeration and Air Conditioning", Tata McGraw Hill, New Delhi.
6. Torr, A. R., "Refrigeration and Air Conditioning", Butterworth publishers, London, 1989.

CO -PO Mapping - DESIGN OF ENERGY EFFICIENT AND HEALTHY BUILDING

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**2**
CO3	**-**	**-**	**-**	**2**	**-**	**2**
CO4	**-**	**2**	**-**	**-**	**2**	**-**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	2+2 =4/2=**2**	2+2 =4/2=**2**

EA4006 CARBON FOOT PRINT AND MEASUREMENT L T P/S C
3 0 0 3

OBJECTIVES:

- By the end of this course students will be expected to Calculate the carbon intensity of the electricity supply for a specific geographic area. Conduct full life cycle analysis of greenhouse gas emissions from a defined consumer product

UNIT I TRENDS IN BUILDING SECTOR EMISSION 09

Energy consumption in different sectors like residential, commercial and public buildings, offices, markets, hospitals, research laboratories. Environmental data in these sectors. - Carbon emission resulting from energy use in buildings.

UNIT II GHG MITIGATION OPTIONS IN BUILDINGS 09

Energy efficiency principles, building energy management systems, -lighting systems, day-lighting, appliances, on-site power, and cost estimate of GHG mitigation in buildings.

UNIT III LOW CARBON REFURBISHMENT IN BUILDINGS 09

Low carbon refurbishment process-3 different phases (prepare, design, construct) refurbishment policy, embodied energy considerations for existing buildings in different sectors. Constraints in adopting building techniques- Limitations of traditional building designs- misplaced incentives-regulatory barriers- social engineering (culture, behavior, rebound effect)- interaction of mitigation options with vulnerability and adaption.

UNIT IV CARBON FOOT PRINTING DURING CONSTRUCTION 09

Social and economic aspects. –Promoting low carbon construction materials- reducing environmental impacts during construction, - aspects of sustainability. Carbon foot print measurement, Methodology of calculating carbon foot print, carbon trust, - system boundary, functional units, life cycle inventory data, carbon credit.

UNIT V ROAD MAP FOR REDUCING EMISSIONS 09

GHG inventory, baseline measures- strategic climatic action plans, - implementation mechanism Techniques to reduce energy consumption in building, Steps to be adopted for reduction, usage of low carbon materials, green travel, transport carbon- case study analysis

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understanding methods of carbon emission from the building usage
CO2	Knowledge about building energy management systems
CO3	Ability to calculate carbon foot print measures of whole building envelope
CO4	Ability to understand the techniques to reduce energy consumption in building,

REFERENCES:

1. ICLEI – Local Governments for Sustainability USA, “The U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions”, October 2012 (Appendix C-I)
2. What colour is your building? David H. Clark, RIBA publishing house, London-2013
3. World Resources Institute and World Business Council for Sustainable Development, The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard (revisededition), pages 10-33.

CO-PO Mapping - CARBON FOOT PRINT AND MEASUREMENT

Course Outcome (CO)	**Programme Outcome (POs)**					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**-**	**2**	**-**	**-**	**3**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**-**
CO3	**3**	**-**	**-**	**2**	**-**	**-**
CO4	**-**	**-**	**-**	**-**	**2**	**3**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	3+2 =5/2=**2.5**	3/1=**3**

EA4007 NATURAL RESOURCE MANAGEMENT L T P/S C
3 0 0 3

OBJECTIVES:

- This course provides an overview of the main management issues which relate to natural resources, particularly land, water, biodiversity, forests and fisheries. The range of topics covered in the course will provide students with a wider perspective on many national and international natural resource management issues and challenges. The focus of the course is to develop understanding for linking community resource management systems with macro- level policies and programmes to create long-enduring management systems.

UNIT I INTRODUCTION TO NATURAL RESOURCE MANAGEMENT 09

Overview of the Subject – Need and Scope; Basic Concepts of Natural Resource Management like Common Property Rights, Collective Action, Traditional Knowledge about Natural Resources Management, Community Based Natural Resource Management.

UNIT II LAND 09

Perception of Land Degradation; Understanding the Causes of Land Degradation; Land Management Practices; Like Soil Conservation, Watershed Management, Management Issues andChallenges

UNIT III WATER 09

Water Supply and Demand, Water Quality Issues, Understanding the Causes, Water Management Practices, Management Issues and Challenges

UNIT IV BIODIVERSITY 09

Biodiversity Services and Human Well-Being; Global and National Trends in Biodiversity Loss; Understanding the Causes, Biodiversity Management Practices, Management Issues and Challenges

Forests- The Principles of Sustainable Forest Management; Forests and Economic Development; Forest Ecosystem Services; Forest Certification Schemes; Community Forest Management. Joint Forest Management, Management Issues and Challenges

UNIT V WILDLIFE AND FISHERIES 09

Conserving Wildlife through Sustainable Use; The Drivers of Marine Fisheries Depletion. Current Approaches to Implementing Sustainable Fisheries Management, Management Challenges and Issues

TOTAL: 45 PERIODS

COURSE OUTCOMES:

O1	Understanding the concepts of natural resource management
CO2	Knowledge about Land and water management systems
CO3	Knowledge of forest management systems
CO4	Ability to understand the trending techniques of sustainable fisheries management

REFERENCES:

1. A Methodological Framework for Gender Participation in Agricultural Resources: A Study ofJhabua District of M.P., Singh S.P. and K.N. Krishna Kumar.
2. Community Forest Management in Tribal States of India (with special reference to MadhyaPradesh), Daspugta S. and D. Debnath, International Book Distributors.
3. Criteria and Indicators for Sustainable Forest Management, Kotwal P.C. and M.D. Omprakash, International Book Distributors, Dehradun.
4. Ecotourism and Livelihoods, Bhattacharya A.K., Concept Publishing Company, New Delhi Forest Certification: A Tool for Sustainable Forest Management, Yadav M., P.C. Kotwal and B.L. Menaria, ISBN: 81-7969-047-4.
5. Governing the Commons: The Evolution of Institutions for Collective Action, Elinor Ostrom.
6. Natural Resources, Agarwal et. all, International Institute for Environment & Development.
7. The Science of Sustainable Development: Local Livelihoods and the Global Environment,Jeffrey Sayer, Cambridge University Press.

CO-PO Mapping - NATURAL RESOURCE MANAGEMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	-	-	2	-
CO2	-	-	3	-	-	-
CO3	-	-	3	-	-	-
CO4	-	-	-	3	-	2
AVERAGE	3/1=**3**	-	3+3 =6/2=**3**	3/1=**3**	2/1=**2**	2/1=**2**

EA4008 ENVIRONMENTAL MANAGEMENT SYSTEMS AND AUDITING **L T P/S C 3 0 0 3**

OBJECTIVES:

- To impart an understanding of systems, approach as per ISO 14001 and skills for themanagement of environmental issues.

UNIT I ENVIRONMENTAL MANAGEMENT STANDARDS 09

Development, trade and environment linkages – Environmental guidelines - Business and Citizen Charters for Sustainable Production and Consumption - National policies on environment, abatement of pollution and conservation of resources-Environmental quality objectives - Environmental standards - Concentration and Mass standards - Effluent and stream standards - Emission and ambient standards -Minimum national standards - Measuring performance evaluation: Indicators, Benchmarking - Systems approach to environmental management

UNIT II PREVENTIVE ENVIRONMENTAL MANAGEMENT 09

Pollution control vis a vis Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies - source reduction, raw material substitution, toxic use reduction and elimination, process modification – Cleaner Production Assessment- Material or resource balance – CP option generation and feasibility analysis

UNIT III ENVIRONMENTAL MANAGEMENT SYSTEM 10

EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.

UNIT IV ENVIRONMENTAL AUDIT 08

Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Non conformance – Corrective and preventive actions -compliance audits – waste audits and waste minimization planning – Environmental statement - Due diligence audit

UNIT V APPLICATIONS 09

Applications of EMS , Waste Audits and Pollution Prevention opportunities in Textile , Sugar, Pulp & Paper, Electroplating, Mining, petroleum refining, Tanning industry, Dairy, Cement, Chemical industries, etc

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understanding the concepts of approach to environmental management
CO2	Knowledge about process of environmental management systems
CO3	Knowledge about roles of environmental audit
CO4	Ability to evaluate the environmental performance indicators of different industries

REFERENCES:

1. Christopher Sheldon and Mark Yoxon, “Installing Environmental management Systems – a step by step guide” Earthscan Publications Ltd, London, 1999.
2. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.
3. ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organisation for Standardisation, 2004
4. ISO 19011: 2002, “Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
5. Paul L Bishop ‘Pollution Prevention: Fundamentals and Practice’, McGraw-Hill International, Boston, 2000.

CO-PO Mapping - ENVIRONMENTAL MANAGEMENT SYSTEMS AND AUDITING

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**2**	**-**
CO2	**-**	**-**	**-**	**2**	**-**	**2**
CO3	**3**	**-**	**-**	**-**	**-**	**-**
CO4	**-**	**-**	**-**	**-**	**-**	**3**
AVERAGE	3+3 =6/2=**3**	**-**	**-**	2/1=**2**	2/1=**2**	2+3 =5/2=**2.5**

MH4074 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

COURSE OUTCOMES

CO1	Knowledge about major social and psychological processes involved in learning and development in an educational setting.
CO2	Knowledge about cognitive learning process
CO3	Ability to engage in knowledgeable and productive dialogue with colleagues about human learning, development, and educational practice
CO4	Ability to linkage theory and models of experiencing Architecture

REFERENCES

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

CO -PO Mapping - PSYCHOLOGY OF LEARNING AND DEVELOPMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	**3**	-	-	-	-	**2**
CO2	-	-	-	**3**	-	-
CO3	-	**3**	-	-	-	**2**
CO4	-	-	**3**	-	-	-
AVERAGE	3/1=**3**	3/1=**3**	3/1=**3**	3/1=**3**	-	2+2 =4/2=**2**

EA4009 ENERGY, CLIMATE CHANGE AND URBAN DEVELOPMENT L T P/S C
3 0 0 3

OBJECTIVES:

- The objective of this course is to make students aware of the scenario of climate change and to provide exposure on discussions happening at national and international levels. After attending this course, the students will be in a position to appreciate the role of settlements in climate change mitigation at the same time they will be able to address impact and adaptations issues faced by human settlements.

UNIT I INTRODUCTION 09

Energy, Climate change and Urban Development – Interface. Understanding Climate Change: Greenhouse gases, Anthropogenic causes, Carbon Cycle, Global Warming, Inventory of GHGs,Urban Heat Islands

UNIT II ENERGY GENERATION AND CONSUMPTION 12

Energy Supply and Demand, Energy Consumption in cities, determinants of energy demand, phenomenon of climate change, factors influencing climate change, impacts of climate change

UNIT III ENERGY PLANNING AND MANAGEMENT, AND MITIGATION AND ADAPTATION TO CLIMATE CHANGE 07

Energy efficient development, Compact city form, Transit oriented development. Mechanisms and measures for mitigating and adapting to climate change at various levels

UNIT IV PLANS, POLICIES AND STRATEGIES 05

Related to energy planning, conservation, climate change mitigation and adaptation.

UNIT V CLIMATE CHANGE 12

An introduction to the Earth's Climate System and Climatic Zones as Basis for Human Activity and Settlements, The Development of Society in Relation to the Local Climatic and Topographic Conditions, Resources Availability (Food, Building Material, Energy), Technical Skills and the Societal Framework, The Conditions for Development, Evolution and Collapse of Civilizations. An Assessment of Population Development and its Implications on Settlements, Buildings and Resource Consumption with Particular Focus on Energy Consumption.

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Knowledge about climate change and its influences in urban areas
CO2	Knowledge about measures for mitigating and adapting to climate change
CO3	Ability to understand linkage about the micro-climatic and topographic condition
CO4	Ability to understand an assessment of population density and resource consumption

REFERENCES:

1. Andres Duany, Jeff Speck and The Smart Growth Manual 2009 McGraw-Hill.
2. Bicknell, Jane Adapting cities to climate change: understanding and addressing the development Change 2009 Earthscan, London.
3. Jenks, Mike; Burgess, Rod Compact cities: Sustainable urban forms for developing countries2000 Spon Press, London.
4. Mike Lydon David Owen Green Metropolis: Why Living Smaller, Living Closer, and Driving Lessare the Keys to Sustainability.
5. S.K Dash Climate change: an Indian perspective, New Delhi 2007 Cambridge University Press.

CO -PO Mapping - ENERGY, CLIMATE CHANGE AND URBAN DEVELOPMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	3	-	3	-	-	-
CO2	-	3	-	3	-	-
CO3	-	-	-	-	3	2
CO4	-	-	-	-	-	2
AVERAGE	3/1=**3**	3/1=**3**	3/1=**3**	3/1=**3**	3/1=**3**	2+2 =4/2=**2**

EA4010 THEORY OF ENVIRONMENTAL PLANNING L T P/S C
3 0 0 3

OBJECTIVES:

- To enable the student to understand the various aspects of environment, their characteristic and mechanism. The policies pertaining to the conservation of the natural environment system.

UNIT I CONCEPTS OF ECOLOGY, ECOSYSTEM AND ENVIRONMENTAL PLANNING 09

History of Environmental Planning, Development of habitat patterns, settlement structure and form in response to environmental challenges; Concepts of Ecology and Ecosystem, Urban Ecosystem.

UNIT II RESOURCE ANALYSIS AND CONSERVATION 12

Resource analysis for various ecosystems and development imperatives (land, geology, soil, climate, water, vegetation) characteristics, exploitation, causative factors for degradation, analytical techniques.

UNIT III ENVIRONMENTAL ZONES 12

Environmental Zones (Hill, coastal, arid, characteristics, resources, settlements pattern, problems and potentials, regulating mechanisms for development.

UNIT IV ENVIRONMENTAL POLICIES, SIGNIFICANT CONVENTIONS, CONFERENCES 06

Environmental Policies and initiatives including policies, strategies, protocols, treaties and agreements.

UNIT V ENVIRONMENTAL LEGISLATIONS IN INDIA 06

Evolution of Indian Legislation (Brief Overview of environment related laws in India); Environmental Movements; Union Government Initiatives • Indian Environmental Acts, Laws and Notification

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understand the various aspects of environment and the policies for its protection.
CO2	Identifying the resource analyses of all ecosystem
CO3	Understand specific Environmental laws in special areas such a hilly area, coastal areas etc
CO4	Ability to analyze the evolution of laws and Initiative for environmental resource protection

REFERENCES:

1. Andrews, Goudie The Human Impact on the Natural Environment – Past, Present and Future2006 Wiley Publishers
2. J.S. Singh, S.P. Ecology Environment and 2008 Anamaya Publishers, New Delhi
3. James K. Lein Integrated Environmental Planning 2002 Wiley Publishers
4. Singh, and S.R. Gupta Resource Conservation Delhi.
5. V.H. Dale, Mary R. English Tools to Aid Environmental Decision Making Latest EditionSwinger.
6. William Fox, Enslin Van Rooyen (eds.) The Quest for Sustainable Development 2004 Juta &Co. Ltd., Cape Town.

CO -PO Mapping - THEORY OF ENVIRONMENTAL PLANNING

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**-**	**2**	**-**	**-**	**3**	**-**
CO2	**-**	**-**	**3**	**-**	**-**	**-**
CO3	**3**	**-**	**-**	**2**	**-**	**-**
CO4	**-**	**-**	**-**	**-**	**2**	**3**
AVERAGE	3/1=**3**	2/1=**2**	3/1=**3**	2/1=**2**	3+2 =5/2=**2.5**	3/1=**3**

EA4011 ENVIRONMENT, DEVELOPMENT AND DISASTER MANAGEMENT L T P/S C 3 0 0 3

OBJECTIVES:

- At the end of the course, the students must have an understanding of the resource optimization and the measures to be taken in the face of a disaster

UNIT I ENVIRONMENT, DEVELOPMENT AND DISASTER MANAGEMENT INTERFACE 06

Resource use, exploitation and conservation; Impact of human activities on environment; Environment and economy interaction, introduction to environmental accounting.

UNIT II ENVIRONMENTAL MANAGEMENT 09

Environmental Impact Assessment, thresholds, indicators, audits, environmental certification, lifecycle analysis, environment and poverty links, environmental policy, Acts and regulations; Environmental education, participatory approaches, emerging concepts. Disaster classification, concepts, hazards, vulnerability, risks, human response to disaster, impacts

UNIT III CONCEPTS OF HAZARD 12

Vulnerability, Risks, Natural Disasters (earthquake, Cyclone, Floods, Volcanoes), and Man Made Disaster (Armed conflicts and civil strip, Technological disasters, Human Settlement, Slow Disasters (famine, draught, epidemics) and Rapid Onset Disasters(Air Crash, tidal waves, Tsunami) Risks, Difference between Accidents and Disasters, Simple and Complex Disasters,

Refugee problems, Political, Social, Economic impacts of Disasters, Gender and Social issues during disasters, principles of psychosocial issues and recovery during emergency situations, Equity issues in disasters, Relationship between Disasters and Development and vulnerabilities, different stake holders in Disaster Relief. Refugee operations during disasters, Human Resettlement and Rehabilitation issues during and after disasters, Inter-sectoral coordination during disasters, Models in Disasters. Impact on Environment.

UNIT IV DISASTER MITIGATION AND MANAGEMENT 09

Relevance of disaster management in development and environment, disaster preparedness, prevention, displacement and development, Role and responsibilities of government and non–government organizations, Disaster Education – awareness of individuals, communities and participation at various levels; Integrating disaster mitigation in the spatial planning process, provision of infrastructure for disaster mitigation.

UNIT V POLICIES AND LEGISLATION PERTAINING TO ENVIRONMENT AND DISASTER MANAGEMENT 09

Policies and Legislation at various levels., Institutional and Legal Arrangements Disaster Management Act, 2005. Role of Central Ministries and Departments, and States, Communications and Information Technology (IT) Support, Community Based Disaster Preparedness, Stakeholders' Participation , Corporate Social Responsibility (CSR) and Public-Private Partnership (PPP).

TOTAL: 45 PERIODS

COURSE OUTCOMES:

CO1	Understand the various contexts leading to disaster
CO2	understand the vulnerability, risks, human response to disaster and its impacts
CO3	Awareness about disaster management and provision of infrastructure for disaster mitigation
CO4	Ability to understand policies and Legislation of disaster management

REFERENCES:

1. Jegadish Gandhi P Disaster Mitigation & Management Post Tsunami Perspectives 2007 Deep & Deep Publications Pvt Ltd, New Delhi
2. Ministry of Home Affairs Model Amendment in Town and Country Planning Legislations, Regulation for Land Use Zoning and Building Byelaws for Structural Safety 2004 MHA 8. Ministry of Home Affairs National Policy on Disaster Management(NPDM) 2006 MHA
3. NDMA Disaster Management Guidelines 2007-11 NDMA
4. P C Sinha Introduction to Disaster Management 2007 Anmol Publications, New Delhi
5. Pardeep Sahni, Alka Dhameja, Uma Medury Disaster Mitigation: Experiences and Reflections 2008 PHI Learning Pvt. Limited, New Delhi
6. Rajib Shaw Community, Environment and Disaster Risk Management 2010 Emerald GroupPublishing Limited
7. Rajib Shaw Hari Srinivas, Anshu Sharma Urban Risk Reduction An Asian Perspective 2009Emerald Group Publishing Limited

CO -PO Mapping - ENVIRONMENT, DEVELOPMENT AND DISASTER MANAGEMENT

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	PO2	PO3	PO4	PO5	PO6
CO1	-	-	-	-	-	2
CO2	2	-	-	-	2	2
CO3	-	-	-	3	-	-
CO4	2	-	-	-	3	-
AVERAGE	2+2 =4/2=**2**	-	-	3/1**=3**	2+3 =5/2=**2.5**	2+2 =4/2=**2**

MH4075 THEORY OF ARCHITECTURAL 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

COURSE OUTCOME

CO1	Awareness of the importance of contextual excellence in architectural design and methods for the same.
CO2	Knowledge about and ability to integrate interdisciplinary and cognitive aspects of learning, teaching and development.
CO3	Ability to understand evolution of technology in education
CO4	Ability to evaluate bloom taxonomy of design studio

REFERENCES

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

CO -PO Mapping - THEORY OF ARCHITECTURAL EDUCATION

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	**3**	**-**	**-**	**-**	**-**	**2**
CO2	**3**	**-**	**-**	**-**	**-**	**-**
CO3	**-**	**3**	**-**	**-**	**-**	**2**
CO4	**-**	**-**	**-**	**-**	**3**	**-**
AVERAGE	3+2 =5/2=**2.5**	3/1=**3**	**-**	**-**	3/1=**3**	2+2 =4/2=**2**

AUDIT COURSES

AX4091 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

COURSE OUTCOME

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

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.

CO-PO Mapping - English for Research Paper Writing

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	1	3	-	-	-	3
CO2	1	3	-	-	-	3
CO3	1	3	-	-	-	3
CO4	1	3	-	-	-	3
CO5	1	3	-	-	-	3
AVERAGE	1+1+1+1 +1=5/5=**1**	3+3+3+3+3 =15/5=**3**	**-**	-	-	3+3+3+3+ 3 =15/5=**3**

AX4092 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

COURSE OUTCOME

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

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.

CO-PO Mapping - Disaster Management

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	3	-	2	-	-	3
CO2	3	-	2	-	-	3
CO3	3	-	2	-	-	3
CO4	3	-	2	-	-	3
CO5	3	-	2	-	-	3
AVERAGE	3+3+3+3+3=15/5=**3**	-	2+2+2+2+2=10/5=**2**	-	-	3+3+3+3+3 =15/5=**3**

AX4093 **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

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

COURSE OUTCOME

CO1	Discuss the growth of the demand for civil rights in India for the bulk of Indians before the arrival of Gandhi in Indian politics
CO2	Discuss the intellectual origins of the framework of argument that informed the conceptualization of social reforms leading to revolution in India
CO3	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.
CO4	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.

CO-PO Mapping - Constitution of India

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	-	3	-	-	-	-
CO2	-	3	-	-	-	-
CO3	-	3	-	-	-	-
CO4	-	3	-	-	-	-
AVERAGE	**-**	3+3+3+3+3 =15/5=**3**	**-**	-	-	-

AX4094	நற்றமிழ் இலக்கியம்	L T P C 2 0 0 0

UNIT I **சங்க இலக்கியம்** **6**

1. தமிழின் துவக்க நூல் தொல்காப்பியம்
– எழுத்து, சொல், பொருள்
2. அகநானூறு (82)
- இயற்கை இன்னிசை அரங்கம்
3. குறிஞ்சிப் பாட்டின் மலர்க்காட்சி
4. புறநானூறு (95,195)
- போரை நிறுத்திய ஔவையார்

UNIT II **அறநெறித் தமிழ்** **6**

1. அறநெறி வகுத்த திருவள்ளுவர்
- அறம் வலியுறுத்தல், அன்புடைமை, ஒப்புரவறிதல், ஈகை, புகழ்
2. பிற அறநூல்கள் - இலக்கிய மருந்து
– ஏலாதி, சிறுபஞ்சமூலம், திரிகடுகம், ஆசாரக்கோவை
(தூய்மையை வலியுறுத்தும் நூல்)

UNIT III **இரட்டைக் காப்பியங்கள்** **6**

1. கண்ணகியின் புரட்சி
- சிலப்பதிகார வழக்குரை காதை
சமூகசேவை இலக்கியம் மணிமேகலை
- சிறைக்கோட்டம் அறக்கோட்டமாகிய காதை

UNIT IV **அருள்நெறித் தமிழ்** **6**

1. சிறுபாணாற்றுப்படை
- பாரி முல்லைக்குத் தேர் கொடுத்தது, பேகன் மயிலுக்குப் போர்வை கொடுத்தது, அதியமான் ஔவைக்கு நெல்லிக்கனி கொடுத்தது, அரசர் பண்புகள்
2. நற்றிணை
அன்னைக்குரிய புன்னை சிறப்பு
3. திருமந்திரம் (617, 618)
- இயமம் நியமம் விதிகள்
4. தர்மச்சாலையை நிறுவிய வள்ளலார்
5. புறநானூறு
- சிறுவனே வள்ளலானான்
6. அகநானூறு (4) - வண்டு
நற்றிணை (11) - நண்டு
கலித்தொகை (11) - யானை, புறா
ஐந்திணை 50 (27) - மான்
ஆகியவை பற்றிய செய்திகள்

UNIT V **நவீன தமிழ் இலக்கியம்** **6**

1. உரைநடைத் தமிழ்,
- தமிழின் முதல் புதினம்,
- தமிழின் முதல் சிறுகதை,
- கட்டுரை இலக்கியம்,
- பயண இலக்கியம்,
- நாடகம்,
2. நாட்டு விடுதலை போராட்டமும் தமிழ் இலக்கியமும்,

3. சமுதாய விடுதலையும் தமிழ் இலக்கியமும்,
4. பெண் விடுதலையும் விளிம்பு நிலையினரின் மேம்பாட்டில் தமிழ் இலக்கியமும்,
5. அறிவியல் தமிழ்,
6. இணையத்தில் தமிழ்,
7. சுற்றுச்சூழல் மேம்பாட்டில் தமிழ் இலக்கியம்.

TOTAL : 30 PERIODS

<u>தமிழ் இலக்கிய வெளியீடுகள் / புத்தகங்கள்</u>

1. தமிழ் இணைய கல்விக்கழகம் (Tamil Virtual University)- www.tamilvu.org
2. தமிழ் விக்கிப்பீடியா (Tamil Wikipedia)-https://ta.wikipedia.org
3. தர்மபுர ஆதீன வெளியீடு
4. வாழ்வியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்
5. தமிழ்கலைக் களஞ்சியம் - தமிழ் வளர்ச்சித் துறை (thamilvalarchithurai.com)
6. அறிவியல் களஞ்சியம் - தமிழ்ப் பல்கலைக்கழகம், தஞ்சாவூர்

CO-PO Mapping - நற்றமிழ் இலக்கியம்

Course Outcome (CO)	Programme Outcome (POs)					
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**
CO1	-	3	-	-	-	-
CO2	-	3	-	-	-	-
CO3	-	3	-	-	-	-
CO4	-	3	-	-	-	-
AVERAGE	**-**	3+3+3+3+3 =15/5=**3**	**-**	-	-	-