1.3.1 Institution integrates crosscutting issues relevant to Professional Ethics, Gender, Human Values, Environment and Sustainability and other value framework enshrined in Sustainable Development Goals and National Education Policy-2020 into the Curriculum.

List of courses for Environment and Sustainability

S.No	Course Code	Course Name	Category	Department offering	Regulation
1.	18CEPE08	Industrial Waste Management	Professional Elective	Civil Engineering	2018
2.	18CEPE09	Hazardous Waste Management	Professional Elective	Civil Engineering	2018
3.	18CEPE10	Air Pollution Monitoring and Control	Professional Elective	Civil Engineering	2018
4.	18CEPE11	Municipal Solid Waste Management	Professional Elective	Civil Engineering	2018
5.	18CEPE12	Marine Pollution Monitoring and Control	Professional Elective	Civil Engineering	2018
6.	18CEPE13	Environmental Impact Assessment	Professional Elective	Civil Engineering	2018
7.	18CEOE01	Environmental Management	Open Elective	Civil Engineering	2018
8.	18CEOE02	Disaster Mitigation and management	Open Elective	Civil Engineering	2018
10.	22AC02	Disaster Management	Mandatory Course	Civil Engineering	2022
11.	22CEOE01	Environmental Management	Open Elective	Civil Engineering	2022
12	22CEOEO2	Disaster Mitigation and management	Open Elective	Civil Engineering	2022
13.	18AC02	Disaster Management	Mandatory Course	Civil Engineering	2018

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Syllabus of the courses for Environment and Sustainability

ENVIRONMENTAL ENGINEERING

18CEPE08	INDUSTRIAL WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

1.	This subject deals with the pollution from major industries and methods of controlling the same. The students are expected to know about the polluting potential of major industries in the country and the methods of controlling the same.

Unit I	INTRODUCTION	9	+	0

Types of industries and industrial pollution – Characteristics of industrial wastes – Population equivalent – Bioassay studies – effects of industrial effluents on streams, sewer, land, sewage treatment plants and human health – Environmental legislations related to prevention and control of industrial effluents and hazardous wastes

Unit II	CLEANER PRODUCTION ORGANISATION	9	+	0

Waste management Approach – Waste Audit – Volume and strength reduction – Material and process modifications – Recycle, reuse and byproduct recovery – Applications

Unit III	POLLUTION FROM MAJOR INDUSTRIES	9	+	0

Sources, Characteristics, waste treatment flow sheets for selected industries such as Textiles, Tanneries, Pharmaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Steelplants, Refineries, fertilizer, thermal power plants – Wastewater reclamation concepts

Unit IV	TREATMENT TECHNOLOGIES	9	+	0

Equalization – Neutralization – Removal of suspended and dissolved organic solids - Chemical oxidation – Adsorption - Removal of dissolved inorganics – Combined treatment of industrial and municipal wastes – Residue management – Dewatering - Disposal

Unit V	HAZARDOUS WASTE MANAGEMENT	9	+	0

Hazardous wastes - Physico chemical treatment – solidification – incineration – Secured land fills.

Total (45+0)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Demonstrate the polluting potential of major industries
CO2	:	Carry out various methods to control the pollutants

Text Books:

1.	M.N.Rao&A.K.Dutta, *Wastewater Treatment*, Oxford - IBH Publication, 1995.
2.	W .W. Eckenfelder Jr., *Industrial Water Pollution Control*, McGraw-HillBook Company, NewDelhi, 2000.

Reference Books:

1.	T.Shen, *Industrial Pollution Prevention*, Springer, 1999
2.	R.L.Stephenson and J.B.Blackburn, Jr., *Industrial Wastewater Systems Hand book*, Lewis Publisher, New Yark, 1998
3.	H.M.Freeman, *Industrial Pollution Prevention Hand Book*, McGraw-Hill Inc., New Delhi,1995.
4.	Bishop, P.L., *Pollution Prevention: Fundamental & Practice*, McGraw-Hill, 2000.

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2		3		1	3				2			2		
CO2	3	2	3			3					2		2		2

1 - Slightly
2 - Moderately
3 - Strongly

18CEPE09	HAZARDOUS WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To impart knowledge and skills in the collection, storage, transport, treatment, disposal and recycling options for hazardous wastes including the related engineeringprinciples, design criteria, methods and equipments

Unit I	SOURCES, CLASSIFICATION AND REGULATORY FRAMEWORK	9	+	0

Types and Sources of hazardous wastes – Need for hazardous waste management – Salient features of Indian legislations on management and handling of hazardous wastes, biomedical wastes, nuclear wastes - lead acid batteries, electronic wastes, plastics and fly ash – Elements of integrated waste management and roles of stakeholders - Financing and Public Private Participationfor waste management.

Unit II	WASTE CHARACTERIZATION AND SOURCE REDUCTION	9	+	0

Waste generation rates and variation - Composition, physical, chemical and biological properties of hazardous wastes – Hazardous Characteristics – TCLP tests – waste sampling and characterization plan - Source reduction of wastes – Waste exchange - Extendedproducer responsibility - Recycling and reuse

Unit III	STORAGE, COLLECTION AND TRANSPORT OF WASTES	9	+	0

Handling and segregation of wastes at source – storage and collection of hazardous wastes – Analysis of Collection systems -Need for transfer and transport – Transfer stations Optimizing waste allocation – compatibility, storage, labeling and handling of hazardous wastes –hazardous waste manifests and transport.

Unit IV	WASTE PROCESSING TECHNOLOGIES	9	+	0

Objectives of waste processing – material separation and processing technologies - biological and chemical conversion technologies – methods and controls of Composting - thermal conversion technologies and energy recovery – incineration - solidification and stabilization of hazardous wastes - treatment of biomedical wastes - Health considerations in the contextof operation of facilities, handling of materials and impact of outputs on the environment

Unit V	WASTE DISPOSAL	9	+	0

Waste disposal options –Disposal in landfills -Landfill Classification, types and methods –site selection -design and operation of sanitary landfills, secure landfills andlandfill bioreactors –leachate and landfill gas management –landfill closure and environmental monitoring –Rehabilitation of open dumps –landfill remediation

Total = 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Understand the characteristics of different types of solid and hazardous wastes and the factors affecting variation
CO2	:	Define andexplain important concepts in the field of solid waste management and suggest suitable technical solutions for treatment of municipal and industrial waste

CO3	:	Understand the role legislation and policy drivers play in stakeholders' response to the waste and apply the basic scientific principles for solving practical waste management challenges

Text Books:	
1.	George Tchobanoglous, Hilary Theisen and Samuel A, Vigil, "Integrated Solid Waste Management, Mc-Graw Hill International edition, New York, 1993.
2.	Michael D. LaGrega, Philip L Buckingham, Jeffrey C. E vansand Environmental Resources Management, Hazardous waste Management, Mc-Graw Hill International edition, NewYork, 2001.
Reference Books:	
1.	1. CPHEEO, "Manual on Municipal Solid waste management, Central Public Health and Environmental Engineering Organisation , Government of India, New Delhi, 2000.
2.	2. Vesilind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning Inc., Singapore,2002.
3.	3. Paul TWilliams, Waste Treatment and Disposal, Wiley, 2005

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1	1	2		3	2		1		1	2	2		2
CO2		2	1	2		2	2	1	1		1	2	2		1
CO3		1	1	1		2	2	2	1		1	2	3		2

1 - Slightly
2 - Moderately
3 - Strongly

18CEPE10	AIR POLLUTION MONITORING AND CONTROL	L	T	P	C
		3	0	0	3

Course Objectives:

1.	This subject covers the sources, characteristics and effects of air and noise pollution and the methods of controlling the same. The student is expected to know about source inventory and control mechanism.
2.	In general, the project brings: Contribution to the overall sustainability of the area. Improvement of overall waste management in the area.
3.	Increased recycling levels and reduction of organic waste in landfills.

Unit I	SOURCES AND EFFECTS OF AIR POLLUTANTS	9	+	0

Classification of air pollutants – Particulates and gaseous pollutants – Sources of air pollution – Source inventory – Effects of air pollution on human beings, materials, vegetation, animals – global warming-ozone layer depletion, Sampling and Analysis – Basic Principles of Sampling – Source and ambient sampling – Analysis of pollutants – Principles.

Unit II	DISPERSION OF POLLUTANTS	9	+	0

Elements of atmosphere – Meteorological factors – Wind roses – Lapse rate - Atmospheric stability and turbulence – Plume rise – Dispersion of pollutants – Dispersion models – Applications

Unit III	AIR POLLUTION CONTROL	9	+	0

Concepts of control – Principles and design of control measures – Particulates control by gravitational, centrifugal, filtration, scrubbing, electrostatic precipitation – Selection criteria for equipment - gaseous pollutant control by adsorption, absorption, condensation, combustion –
Pollution control for specific major industries.

Unit IV	AIR QUALITY MANAGEMENT	9	+	0

Air quality standards – Air quality monitoring – Preventive measures - Air pollution control efforts – Zoning – Town planning regulation of new industries – Legislation and enforcement – Environmental Impact Assessment and Air quality

Unit V	NOISE POLLUTION	9	+	0

Sources of noise pollution – Effects – Assessment - Standards – Control methods - Prevention

Total = 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Causes of air pollution
CO2	:	Effects of air and noise pollution
CO3	:	Effective air pollution management

Text Books:

1. Anjaneyulu, D., *Air Pollution and Control Technologies*, AlliedPublishers,Mumbai, 2002.
2. Rao, C.S., *Environmental Pollution Control Engineering*, Wiley Eastern Ltd., New Delhi, 1996.

Reference Books:

1. RaoM.N., and Rao H. V. N., *Air Pollution Control*, Tata-McGraw-Hill, New Delhi, 1996.
2. W.L.Heumann, *Industrial Air Pollution Control Systems*, McGraw-Hill, New York, 1997
3. Mahajan S.P., *Pollution Control in Process Industries*, Tata McGraw-Hill Publishing Company, New Delhi, 1991.
4. Peavy S.W., Rowe D.R. and Tchobanoglous G. *Environmental Engineering*, McGraw Hill, New Delhi, 1985.
5. Garg, S.K., *Environmental Engineering Vol. II*, Khanna Publishers, New Delhi

CO-PO-PSO MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1	2	2		1	1	1	1	1	2	2	1		2
CO2	1	2	2	2	2	2	2		1	2	3	3	3		2
CO3	2	3	3	2	2	2	2	1	1	2	3	3	3		2

1 - Slightly
2 - Moderately
3 - Strongly

18CEPE11	MUNICIPAL SOLID WASTE MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

1.	This subject covers the various sources and characterisation of municipal solid wastes and the on-site/off-site processing of the same and the disposal methods.
2.	The student is expected to know about the various effects and disposal options for the municip solidwaste.
3.	Provide efficient and economical refuse collection, recycling, and disposal services.

Unit I	SOURCES AND TYPES OF MUNICIPAL SOLID WASTES	9	+	0

Sources and types of solid wastes - Quantity – factors affecting generation of solid wastes; characteristics – methods of sampling and characterization-Effects of improper disposal of solid wastes – public health effects. Principle of solid waste management – social & economic aspects- Public awareness- Role of NGOs- Legislation.

Unit II	ON-SITE STORAGE & PROCESSING	9	+	0

On-site storage methods – materials used for containers – on-site segregation of solid wastes – public health & economic aspects of storage – options under Indian conditions – Critical Evaluation of Options.

Unit III	COLLECTION AND TRANSFER	9	+	0

Methods of Collection – types of vehicles – Manpower requirement – collection routes- transfer stations – selection of location, operation & maintenance; options under Indian conditions.

Unit IV	OFF-SITE PROCESSING	9	+	0

Processing techniques and Equipment; Resource recovery from solid wastes – composting, incineration, Pyrolysis - options under Indian conditions.

Unit V	DISPOSAL	9	+	0

Dumping of solid waste; sanitary lands fills – site selection, design and operation of sanitary landfills – Leachate collection & treatment.

Total = 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Sources and characterization of municipal solid wastes
CO2	:	On-site/off-site processing of municipal solid wastes and disposal methods.
CO3	:	Effective municipal solid waste management

Text Books:

1. George Tchobanoglousetc.al.,*Integrated Solid Waste Management*, McGraw-Hill,Publishers, 1993.

Reference Books:

1. B.Bilitewski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, *WasteManagement*, Springer, 1994.
2. *Manual on Municipal Solid Waste Management*, CPHEEO, Ministry of Urban Development, Government of India,NewDelhi, 2000
3. R.E.Landreth and P.A.Rebers, *Municipal Solid Wastes - problems and Solutions*,Lewis Publishers, 1997
4. Peavy S.W., Rowe D.R. and Tchobanoglous G. *Environmental Engineering*, McGraw Hill, New Delhi, 1985.
5. Garg, S.K., *Environmental Engineering Vol. II*, Khanna Publishers, New Delhi

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3	2	1	2	2			1	2	1	3		2
CO2		2	3	3	1	3	2	1	2	2	3	2	2		3
CO3	2	3	3	3	1	3	3	1	3	2	3	2	3		3

1 - Slightly
2 - Moderately
3 - Strongly

18CEPE12	MARINE POLLUTION MONITORING AND CONTROL	L	T	P	C
		3	0	0	3

Course Objectives:

1.	This subject educated the students about Coastal and Marine environment, ocean dynamics, sources of marine pollution and methods for monitoring, modeling and control.
2.	The subject deals with the method for monitoring the marine pollution.
3.	The subject cover modelling and controlling methods of marine pollution.

Unit I	MARINE ENVIRONMENT	9	+	0

Seas and oceans, Continental area, Coastal zone, Properties of sea water, Principles of Marine Geology, coastal features –Beaches, Estuaries, Lagoons– The oceans andclimate

Unit II	OCEAN HYDRODYNAMICS	9	+	0

Wave Theory, Waves in shallow waters –Refraction, Diffraction and Shoaling, Approximations for deep and shallow water conditions –Tidal Classification-
General circulation of ocean waters-Ocean currents -Coastal sediment transport -
Onshore offshore sediment transport -Beach formation and coastal processes -Tsunamis, storm surge, El Nino effect.

Unit III	MARINE POLLUTION SOURCES AND EFFECTS	9	+	0

Sources of Marine Pollution –Point and non-point sources, Pollution caused by Oil Exploration, Dredging, Offshore Structures, Agriculture Impacts of pollution onwater quality and coastal ecosystems –Marine discharges and effluent standards

Unit IV	MONITORING OF MARINE POLLUTION	9	+	0

Basic measurements -Sounding boat, lead lines, echo sounders –current meters -tide gauge -use of GPS –Measurement of coastal water characteristics –sea bed sampling
–Modeling of Pollutant transport and dispersion -Oil Spill Models -Ocean Monitoring satellites – Applications of Remote Sensing and GIS in monitoring marine pollution

Unit V	MARINE POLLUTION CONTROL AND ICZM	9	+	0

Design of out falls -Pollution Control strategies –Selection of optimal Outfall locations -National and International Treaties, Coastal Zone Regulation–Total Maximum Daily Load applications –Protocols in Marine Pollution – ICZM and Sustainable Development

Total = 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Abilitytoknowaboutmarineenvironmentandwouldhavelearntthephysicalconcepts lying behind the oceanic curents and natural processes of various activities happening over the marineenvironment.
CO2	:	Acquired knowledge on the marine pollution and the effect of the same on the ecology
CO3	:	Should have gained knowledge on remote sensing and various other techniques for measuring and monitoring oceanic environmentparameters
CO 4	:	Should have acquired knowledge on control of marine pollution and sustainable development

Text Books:

1.	Marine Pollution (5thEdition) R.B. Clark, C. Frid and M Atttrill Oxford Science Publications,

	2001
2.	Marine pollution Dr.P.C.Sinha ,Anmol Publications Pvt. Ltd, 1998
Reference Books:	
1.	Problems of Marine Pollution : India and Canada, Raghavan, Sudha , Eastern Book Corporation,Delhi, India,
2.	Laws, E.A., Aquatic pollution, an introductory text. John Wiley and Sons, Inc., New York, 2000

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1			1	2	2	2	1				1	1	1		2
CO2	1		2	2	2	3	1			1	1	2	1		2
CO3	1	2	2	2	2	3	2		2		1	2	1		2
CO4	1	1	2	2	2	3	1	1		2	1	3	1		2

1 - Slightly
2 - Moderately
3 - Strongly

18CEPE13	ENVIRONMENTAL IMPACT ASSESSMENT	L	T	P	C
		3	0	0	3

Course Objectives:

1.	This subject deals with the various impacts of infrastructure projects on the components of environment and method of assessing the impact and mitigating the same.
2.	The student is expected to know about the various impacts of development projects on environment and the mitigating measures.
3.	The subject deals with to identify, predict and evaluate the economic, environmental and social impact of development activities.

Unit I	**INTRODUCTION**	9	+	0

Impact of development projects under Civil Engineering on environment - Environmental Impact Assessment (EIA) - Environmental Impact Statement (EIS) – EIA capability and limitations – Legal provisions on EIA.

Unit II	**METHODOLOGIES**	9	+	0

Methods of EIA –Check lists – Matrices – Networks – Cost-benefit analysis – Analysis of alternatives – Case studies

Unit III	**PREDICTION AND ASSESSMENT**	9	+	0

Assessment of Impact on land, water and air, noise, social, cultural flora and fauna- Mathematical models- public participation – Rapid EIA.

Unit IV	**ENVIRONMENTAL MANAGEMENT PLAN**	9	+	0

Plan for mitigation of adverse impact on environment – options for mitigation of impact on water, air and land, flora and fauna; Addressing the issues related to the Project Affected People – ISO 14000

Unit V	**CASE STUDIES**	9	+	0

EIA for infrastructure projects – Bridges – Stadium – Highways – Dams – Multi-storey Buildings – Water Supply and Drainage Projects

Total (45+0)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Impacts of development projects on environment
CO2	:	Mitigating measures on environmental impact accessment
CO3	:	Safe environmental plan to avoid Impacts on water, air, land, flora and fauna

Text Books:

1. Canter, R.L., *Environmental Impact Assessment*, McGraw-Hill Inc., New Delhi, 1996.

Reference Books:

1. Shukla, S.K. and Srivastava, P.R., *Concepts in Environmental Impact Analysis*, Common Wealth Publishers, New Delhi, 1992.
2. John G. Rau and David C Hooten (Ed)., *Environmental Impact Analysis Handbook*, McGraw-Hill Book Company, 1990
3. Judith Petts, *Handbook of Environmental Impact Assessment Vol. I & II*, BlackwellScience, 1999.

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	1	3	2	3	3	2	1	1	3	1	1	1	3	1	2
CO2	1	3	2	3	3	2	1		1	1	1	1	3		2
CO3	1	3	2	3	3	2	1		1	1	1	1	3		2

OPEN ELECTIVES

18CEOE01	Environmental Management	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To impart an understanding of systems approach to Environmental Management as per ISO 14001 and skills for environmental performance in terms of legal compliance, pollution prevention and continual improvement.

Unit I	ENVIRONMENTAL MANAGEMENT STANDARDS	9	+	0

Unique Characteristics of Environmental Problems - Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption –Tools, Business strategy drivers and Barriers -Evolution of Environmental Stewardship –Environmental Management Principles - National policies on environment, abatement of pollution and conservation of resources.

Unit II	PREVENTIVE ENVIRONMENTAL MANAGEMENT	9	+	0

Pollution control Vs Pollution Prevention - Opportunities and Barriers –Cleaner production and Clean technology, closing the loops, zero discharge technologies
Four Stages and nine approaches of Pollution Prevention -Getting management commitment – Analysis of Process Steps-source reduction, raw material substitution, toxic use reduction and elimination, process modification – material balance – Technical, economical and environmental feasibility evaluation of Pollution Prevention options in selected industries –Preventive Environmental Management over Product cycle.

Unit III	ENVIRONMENTAL MANAGEMENT SYSTEM	9	+	0

EMS, ISO 14000 - EMS as per ISO 14001–benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental 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	9	+	0

Environmental audit – role of auditing – history – definitions audit methodology – evaluation audit results – audit reports – case studies.

Unit V	APPLICATIONS	9	+	0

Applications of EMS , Waste Audits and Pollution Prevention- cost benefit analysis in environmental Problems.
Water quality management – concepts – riparian rights – monitoring programmes – technology transfer – common effluent treatment concept.
Air quality management – emission inventory – ambient air quality in the region – spotting of violations – corrective measures – technology transfer.
Solid waste management – land pollution from solid and liquid wastes - spotting of violations – corrective measures – technology transfer.

Total (45+0)= 45 Periods

Course Outcomes: On completion of the course, the student is expected to be able to	
1	Understand the necessity of environmental management that will be caused by projects or industries.
2	Gain the Knowledge about the legal requirements of Environmental management and auditing.
3	Lead pollution prevention assessment team and implement waste minimization options.
4	Develop, Implement, maintain and Audit Environmental Management systems for Organisations.

Text Books:	
1.	1.Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems –a step by step guide" Earthscan Publications Ltd, London, 1999.
2.	ISO 14001/14004: Environmental management systems –Requirements and Guidelines – International Organisation for Standardisation, 2004.

Reference Books:	
1.	1.ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002.
2.	Paul LBishop „Pollution Prevention: Fundamentals and Practice", McGraw -Hill International, Boston,2000.
3.	Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001

CO-PO-PSO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		1				3	3					1	1	1	2
CO2						3	3	2		1		1		1	2
CO3		2	1			3	3		3	1	1	1			2
CO4		1	1		2	3	3			1	1	1	1	1	2

1 - Slightly
2 - Moderately
3 - Strongly

18CEOE02	DISASTER MITIGATION AND MANAGEMENT	L	T	P	C
		3	0	0	3

Course Objectives:

1.	To provide students an exposure to disasters, their significance and types.
2.	To ensure that students begin to understand the relationship between vulnerability disasters, disaster prevention and risk reduction
3.	To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)

Unit I	INTRODUCTION TO DISASTERS	9	+	0

Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquake, Landslide, Flood, Drought, Fire etc - Classification, Causes, Impacts including social, economic, political, environmental, health, psychosocial, etc.- Differential impacts- in terms of caste, class, gender, age, location, disability- Global trends in disasters: urban disasters, pandemics, complex emergencies, Climate change- Dos and Don"ts during various types of Disasters.

Unit II	APPROACHES TO DISASTER RISK REDUCTION (DRR)	9	+	0

Disaster cycle - Phases, Culture of safety, prevention, mitigation and preparedness community based DRR, Structural- nonstructural measures, Roles and responsibilities of- community, Panchayati Raj Institutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institutional Processess and Framework at State and Central Level- State Disaster Management Authority(SDMA) – Early Warning System – Advisories from Appropriate Agencies.

Unit III	INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT	9	+	0

Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dams, embankments, changes in Land-use etc.- Climate Change Adaptation- IPCC Scenario and Scenariosin the context of India - Relevance of indigenous knowledge, appropriate technology and local resources.

Unit IV	DISASTER RISK MANAGEMENT IN INDIA	9	+	0

Hazard and Vulnerability profile of India, Components of Disaster Relief: Water, Food, Sanitation, Shelter, Health, Waste Management, Institutional arrangements (Mitigation, Response and Preparedness, Disaster Management Act and Policy - Other related policies, plans, programmes and legislation – Role of GIS and Information Technology Components in Preparedness, Risk Assessment, Response and Recovery Phases of Disaster – Disaster Damage Assessment.

Unit V	DISASTER MANAGEMENT: APPLICATIONS AND CASE STUDIES AND FIELD WORKS	9	+	0

Landslide Hazard Zonation: Case Studies, Earthquake Vulnerability Assessment of Buildings and Infrastructure: Case Studies, Drought Assessment: Case Studies, Coastal Flooding: Storm Surge Assessment, Floods: Fluvial and Pluvial Flooding: Case Studies; Forest Fire: Case Studies, Man Made disasters: Case Studies, Space Based Inputs for Disaster Mitigation and Management and field works related to disaster management

Total = 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:		
CO1	:	Differentiate the types of disasters, causes and their impact on environment and society
CO2	:	Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO3	:	Draw the hazard and vulnerability profile of India, Scenarious in the Indian context, Disaster damage assessment and management.

Text Books:	
1.	Singhal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13: 978-9380386423
2.	Tushar Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt. Ltd., 2012. **ISBN-10:** 1259007367, **ISBN-13:** 978-1259007361]
Reference Books:	
1.	Govt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2.	Government of India, National Disaster Management Policy,2009.

CO-PO-PSO MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1		2	3	1		3	2	1	1	1	1	1	2	1	1
CO2	1	2	3	1	1	3	3	1	1	1	1	1	3	1	2
CO3	1	2	3	1	2	3	2	1	1	1	1	1	2	1	2

1 - Slightly
2 - Moderately
3 - Strongly

18AC02 **DISASTER MANAGEMENT** **L T P C**

2 - - 0

COURSE OBJECTIVES: Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response
2. Critically evaluate disaster risk reduction and humanitarian response policy and practice from multiple perspectives.
3. Develop an understanding of standards of humanitarian response and practical relevance in specific types of disasters and conflict situations
4. Critically understand the strengths and weaknesses of disaster management approaches

UNIT I INTRODUCTION **4 + 0**

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 **4 + 0**

Economic Damage, Loss of Human And Animal Life, Destruction of Ecosystem. Natural Disasters: Earthquakes, Volcanism, 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 **4 + 0**

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 **4 + 0**

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 **4 + 0**

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.

UNIT VI DISASTER MITIGATION **4 + 0**

Meaning, Concept And Strategies of Disaster Mitigation, Emerging Trends In Mitigation. Structural Mitigation And Non-Structural Mitigation, Programs of Disaster Mitigation In India.

Total= 24 Periods

COURSE OUTCOMES:

Upon completion of this course, the students will be able to:

CO1 : Develop an understanding of the key concepts and the significance of disaster management

CO2 : Understand the occurrences, reasons and mechanism for various types of disaster.

CO3 : Have a basic understanding of the Disaster Preparedness and Management

CO4 : Develop a basic under the understanding of Risk assessment, Prevention, Mitigation, Response and Recovery.

TEXT BOOKS:

1. R. Nishith, Singh AK 2012 Disaster Management in India:Perspectives, issues and strategies New Royal Book Company, Lucknow
2. Sahni, PardeepEt.Al. (Eds.) 2002 Disaster Mitigation Experiences And Reflections. Prentice Hall Of India, New Delhi.

REFERENCE BOOKS:

1. Goel S. L. 2007 Disaster Administration And Management Text And Case Studies Deep &Deep Publication Pvt. Ltd., New Delhi.
2. Mishra A 2012 New Dimensions of Disaster Management in India: Perspectives Approaches and Strategies (Set of 2 Vols) Serials publications, New Delhi.
3. Sharma, Kadambari C, Avina 2010 Disaster Management in India JnanadaPrakashan [P&D], New Delhi.

CO-PO MAPPING

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	1	1	1	1	-	-	1	-	-	2	1	1	1	-
CO2	1	1	1	-	-	-	2	1	-	1	1	-	1	-
CO3	1	1	1	-	-	-	1	-	-	1	1	-	-	1
CO4	1	1	1	1	1	-	1	-	-	1	1	-	-	-

1- Faintly
2- Moderately
3- Strongly

22AC02 **DISASTER MANAGEMENT**

Course Objectives: -Students will be able to:

. Learn to demonstrate a critical understanding of key concepts in disaster riskreductionandhumanitarian response.

. Critically evaluatedisasterriskreductionandhumanitarianresponsepolicyandpractice from multipleperspectives.

. develop an understanding of standards of humanitarian response and practical relevanceinspecific types of disasters and conflict situations.

. critically understand the strengths and weaknesses of disaster management approaches,planning and programming in different countries, particularly their homecountry or the countriesthey work in.

Syllabus

Units	CONTENTS	Hours
1	**Introduction** Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	4
2	**Repercussions Of Disasters And Hazards:** Economic Damage,LossOf Human And Animal Life, Destruction OfEcosystem. Natural Disasters: Earthquakes, Volcanisms, Cyclones, Tsunamis, Floods, Droughts And Famines, Landslides And Avalanches, Man- madedisaster: Nuclear Reactor Meltdown, Industrial Accidents, Oil Slicks And Spills, Outbreaks Of Disease And Epidemics, War And Conflicts.	4
3	**Disaster Prone Areas In India** 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 DiseasesAnd Epidemics	4
4	**Disaster Preparedness And Management** Preparedness: Monitoring Of Phenomena Triggering A Disaster Or Hazard;EvaluationOf Risk: Application Of Remote Sensing, Data From MeteorologicalAndOtherAgencies,MediaReports:GovernmentalAnd Community Preparedness	4
5	**Risk Assessment** 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.	4
6	**Disaster Mitigation** Meaning, Concept And Strategies Of Disaster Mitigation, Emerging TrendsInMitigation.StructuralMitigationAndNon-StructuralMitigation, Programs Of Disaster Mitigation In India.	4

SUGGESTED READINGS:

1. R.Nishith, Singh AK, “Disaster Management in India: Perspectives, issues and strategies“’New Royal bookCompany.
2. Sahni, PardeepEt.Al. (Eds.),” Disaster Mitigation Experiences And Reflections”, Prentice HallOf India, NewDelhi.
3. GoelS.L.,Disaster Administration And Management Text And Case Studies” ,Deep&Deep Publication Pvt. Ltd., New Delhi.