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.

S.No	Course Code	Course Name	Category	Department offering	Regula tion
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

List of courses for Environment and Sustainability



Syllabus of the courses for Environment and Sustainability

ENVIRONMENTAL ENGINEERING

	CEPE08	INDUSTRIAL WASTE MANAGEMENT	L	Т	Р	С
			3	0	0	3
Cou	ırse Objeo	ctives:				
1.	This sub	ject deals with the pollution from major industries and methods of control	ling t	he		
		ne students are expected to know about the polluting potential of major i	-		s in	
		antry and the methods of controlling the same.				
Uni	it I INT	RODUCTION	9		+	0
Тур	es of indus	tries and industrial pollution – Characteristics of industrial wastes – Popul	latior	equ	uiva	lent
– Bi	oassay stu	dies – effects of industrial effluents on streams, sewer, land, sewage treat	ment	pla	nts	and
		- Environmental legislations related to prevention and control of				
indı	ustrial effl	uents and hazardous wastes				
					1	_
		ANER PRODUCTION ORGANISATION	9		+	0
	-	ement Approach – Waste Audit – Volume and strength reduction – Mater	ial ar	nd p	oroc	ess
mod	difications	– Recycle, reuse and byproduct recovery – Applications				
Uni	it III P	OLLUTION FROM MAJOR INDUSTRIES	9		+	0
		acteristics, waste treatment flow sheets for selected industries such as Text	-		т	U
		armaceuticals, Electroplating industries, Dairy, Sugar, Paper, distilleries, Sto		nto		
		tilizer, thermal power plants – Wastewater reclamation concepts	eeipia	ants	,	
Ken	illeries, iei	tilizer, thermal power plants – wastewater reclamation concepts				
Uni	t IV TR	EATMENT TECHNOLOGIES	9		+	0
		Neutralization – Removal of suspended and dissolved organic solids - Chen	-			U
-		dsorption - Removal of dissolved inorganics – Combined treatment of indu		al ar	hd	
		stes – Residue management – Dewatering - Disposal	ustil	11 21	Iu	
mu	merpur mu					
Uni	it V HAZ	ARDOUS WASTE MANAGEMENT	9		+	0
	-	ARDOUS WASTE MANAGEMENT	-	nd fi	-	0
	-		-	nd fi	-	0
	-	ARDOUS WASTE MANAGEMENT	-	nd fi	-	0
Haz	-	ARDOUS WASTE MANAGEMENT Istes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods	-	nd fi	-	0
Haz Cou	ardous wa	ARDOUS WASTE MANAGEMENT Istes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods	-	nd fi	-	0
Haz Cou	ardous wa	ARDOUS WASTE MANAGEMENT Istes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes:	-	nd fi	-	0
Haz Cou Upo	ardous wa	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to:	-	nd fi	-	0
Haz Cou Upo CO1 CO2	ardous wa	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to: emonstrate the polluting potential of major industries	-	nd fi	-	0
Haz Cou Upo CO1 CO2	ardous water arse Outco on complet 1 : D 2 : Ca tt Books: M.N.Rao	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to: emonstrate the polluting potential of major industries arry out various methods to control the pollutants &A.K.Dutta, Wastewater Treatment, Oxford - IBH Publication, 1995.	-	nd fi	-	0
Haz Cou Upo CO2 Tex 1.	ardous water arse Outco on complet 1 : D 2 : Ca tt Books: M.N.Rao	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to: emonstrate the polluting potential of major industries arry out various methods to control the pollutants	-		-	
Haz Cou CO1 CO2 Tex 1. 2.	ardous wa arse Outco on complet 1 : D 2 : Ca t Books: M.N.Rao8 W .W. E NewDelh	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to: emonstrate the polluting potential of major industries arry out various methods to control the pollutants &A.K.Dutta, Wastewater Treatment, Oxford - IBH Publication, 1995. ckenfelder Jr., Industrial Water Pollution Control, McGraw-HillBook i, 2000.	-		ills.	
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Haz Upo CO1 CO2 Tex 1. 2. Ref 1.	ardous wa arse Outco on complet 1 : D 2 : Ca t Books: M.N.Rao& W .W. E NewDelh erence Bo T.Shen, <i>In</i> R.L.Stepl <i>book</i> , Lev H.M.Free	ARDOUS WASTE MANAGEMENT astes - Physico chemical treatment – solidification – incineration – Secure Total (45+0)= 45 Periods omes: ion of this course, the students will be able to: emonstrate the polluting potential of major industries arry out various methods to control the pollutants &A.K.Dutta, <i>Wastewater Treatment</i> , Oxford - IBH Publication, 1995. ckenfelder Jr., <i>Industrial Water Pollution Control</i> , McGraw-HillBook i, 2000. poks: mdustrial Pollution Prevention, Springer, 1999 henson and J.B.Blackburn, Jr., <i>Industrial Wastewater Systems Hand</i>	ed lar	Con	mpa	

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PS 03
CO1	2		3		1	3				2			2		
CO2	3	2	3			3					2		2		2

	HAZARDOUS WASTE MANAGEMENT	L	Т	Р	С
		3	0	0	3
Course Obje	tives:				
and rec	rt knowledge and skills in the collection, storage, transport, treatment, o cling options for hazardous wastes including the related engineeringpri riteria, methods and equipments	-			
uesign e					
Unit I SO	JRCES, CLASSIFICATION AND REGULATORY FRAMEWORK	9		+	0
Types and Sc	urces of hazardous wastes - Need for hazardous waste management -	Salie	ent f	eatu	res
-	slations on management and handling of hazardous wastes, biomedical				
	acid batteries, electronic wastes, plastics and fly ash - Elements of	integ	rate	d wa	iste
-	and roles of stakeholders - Financing and Public Private Participationfor				
waste manage	ment.				
Unit II WA	STE CHARACTERIZATION AND SOURCE REDUCTION	9		+	0
Waste genera	tion rates and variation - Composition, physical, chemical and biol	ogica	l pro	per	ties
of hazardous	vastes – Hazardous Characteristics – TCLP tests – waste sampling and chara	acteri	zati	on p	lar
- Source redu	ction of wastes – Waste exchange - Extendedproducer				
responsibility	- Recycling and reuse				
Unit III S	FORAGE, COLLECTION AND TRANSPORT OF WASTES	9		+	0
	segregation of wastes at source – storage and collection of hazardous w	-	- ^		-
-	ystems -Need for transfer and transport – Transfer stations Optimizing w			-	
	storage, labeling and handling of hazardous wastes -hazardous	aste	11100	atio	
	sts and transport.				
	STE PROCESSING TECHNOLOGIES	9		+	0
	waste processing - material separation and processing technologies	- bio			
chemical con				vers	ior
	version technologies – methods and controls of Composting - the				
technologies a	nd energy recovery – incineration - solidification and stabilization of haz				
technologies a treatment of	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof	zardo			
technologies a treatment of	nd energy recovery – incineration - solidification and stabilization of haz	zardo			
technologies a treatment of l operation of f	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof	zardo			
technologies a treatment of b operation of f Unit V WA Waste disposa	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL l options –Disposal in landfills -Landfill Classification, types and method	zardo z 9 ls –si	us w	vaste + elect	es 0 ior
technologies a treatment of l operation of f Unit V WAS Waste disposa -design and o	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL l options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –leac	zardo z 9 ds –si shate	us w	vaste + elect	es 0 ior
technologies a treatment of a operation of f Unit V WAS Waste disposa -design and o gas managem	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL I options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –leac ent –landfill closure and environmental monitoring –Rehabilitation of opp	zardo z 9 ds –si shate	us w	vaste + elect	es 0 ior
technologies a treatment of a operation of f Unit V WAS Waste disposa -design and o gas managem	nd energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL l options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –leac	zardo z 9 ds –si shate	us w	vaste + elect	es 0 ior
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technologies a treatment of l operation of f Unit V WAS Waste disposa -design and o gas managem dumps –landf	Ind energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL I options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –leac ent –landfill closure and environmental monitoring –Rehabilitation of op- ill remediation	zardo z 9 ds –si shate	us w	vaste + elect	es 0 ior
technologies a treatment of l operation of f Unit V WAS Waste disposa -design and o gas managem dumps –landf Total = 45 Pe Course Outco	Ind energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL I options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –leac ent –landfill closure and environmental monitoring –Rehabilitation of op- ill remediation	zardo z 9 ds –si shate	us w	vaste + elect	es 0 ior
technologies a treatment of l operation of f Unit V WAS Waste disposa -design and o gas managem dumps –landf Total = 45 Pe Course Outco	Ind energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL I options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –lead ent –landfill closure and environmental monitoring –Rehabilitation of op- ill remediation	zardo z 9 ds –si chate en	us w	+ elect lanc	0 ior
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technologies a treatment of 1 operation of f Unit V WAS Waste disposa -design and o gas managem dumps –landf Total = 45 Pe Course Outco Upon complet CO1 : U fa CO2 : D	Ind energy recovery – incineration - solidification and stabilization of haz biomedical wastes - Health considerations in the contextof acilities, handling of materials and impact of outputs on the environment STE DISPOSAL I options –Disposal in landfills -Landfill Classification, types and method peration of sanitary landfills, secure landfills andlandfill bioreactors –lead ent –landfill closure and environmental monitoring –Rehabilitation of op- ill remediation Friods Omes: ion of this course, the students will be able to: inderstand the characteristics of different types of solid and hazardous w	zardo z 9 ds –si chate en zastes ent	te se and and	+ elect lanc	0 ior lfil

CO	3	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
Тех	t Boo	ks:
1.	Georg Wast	ge Tchobanoglous, Hilary Theisen and Samuel A, Vigil, "Integrated Solid e Management, Mc-Graw Hill International edition, New York, 1993.
	Mich	ael D. LaGrega, Philip L Buckingham, Jeffrey C. E vansand Environmental Resources
2.	Mana	gement, Hazardous waste Management, Mc-Graw Hill International edition, NewYork,
	2001	
Ref	erenc	e Books:
1.		HEEO, "Manual on Municipal Solid waste management, Central Public Health and nvironmental Engineering Organisation , Government of India, New Delhi, 2000.
2.		silind P.A., Worrell W and Reinhart, Solid waste Engineering, Thomson Learning nc., Singapore,2002.
3.	3. Pa	ul TWilliams, Waste Treatment and Disposal, Wiley, 2005

CO/PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	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

	BCEPE10 AIR POLLUTION MONITORING AN	ID CONTROL	L 3	T	P	C 3
Cou	urse Objectives:		3	0	0	3
1.	This subject covers the sources, characteristics and effect	s of air and noise pollu	tion and	the		
1.	methods of controlling the same. The student is expect				rv a	nd
	control mechanism.				-) .	
2.	In general, the project brings: Contribution to the overa		area.			
	Improvement of overall waste management in the area					
3.	Increased recycling levels and reduction of organic was	te in landfills.				
					r –	
Uni			9		+	0
	ssification of air pollutants – Particulates and gaseous pour arce inventory – Effects of air pollution on human being					
	rming-ozone layer depletion, Sampling and Analysis – Basic F					
	npling – Analysis of pollutants – Principles.	- Therpies of Sampling	Jourcea	anu a		nen
Uni	it II DISPERSION OF POLLUTANTS		9		+	0
Eler	ements of atmosphere – Meteorological factors – Wind rose	s – Lapse rate - Atmos	pheric s	tabi	lity	
and	d turbulence – Plume rise – Dispersion of pollutants – Disp	ersion models – Appli	cations		-	
	it III AIR POLLUTION CONTROL		9		+	0
	ncepts of control – Principles and design of control measur					
	ntrifugal, filtration, scrubbing, electrostatic precipitation – S		luipmen	t - ,	gase	eou
	llutant control by adsorption, absorption, condensation, con	nbustion –				
Poll	llution control for specific major industries.					
II:						
UIII	SFIV AID AUALITY MANACEMENT					
	IIT IV AIR QUALITY MANAGEMENT		9		+	0
Air	quality standards – Air quality monitoring – Preventive m		control		rts -	-
Air Zon	r quality standards – Air quality monitoring – Preventive monitoring – Preventive monitoring – Town planning regulation of new industries – Legisl		control		rts -	-
Air Zon	quality standards – Air quality monitoring – Preventive m		control		rts -	-
Air Zon Imp	quality standards – Air quality monitoring – Preventive monitoring – Preventive monitoring – Town planning regulation of new industries – Legisl pact Assessment and Air quality		control t – Envir		rts - nent	- tal
Air Zon Imp	r quality standards – Air quality monitoring – Preventive monitoring – Town planning regulation of new industries – Legisl pact Assessment and Air quality	ation and enforcemen	control t – Envir	ronn	rts -	- tal
Air Zon Imp	quality standards – Air quality monitoring – Preventive monitoring – Preventive monitoring – Town planning regulation of new industries – Legisl pact Assessment and Air quality	ation and enforcemen	control t – Envir	ronn	rts - nent	- tal
Air Zon Imp	r quality standards – Air quality monitoring – Preventive monitoring – Town planning regulation of new industries – Legisl pact Assessment and Air quality	ation and enforcemen	control t – Envir	ion	rts - nent	- tal
Air Zon Imp Uni Sour	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality hit V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urse Outcomes:	ation and enforcemen	control t – Envin 9 Preventi	ion	rts - nent	- tal
Air Zon Imp Uni Sour Cou	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality it V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urse Outcomes: on completion of this course, the students will be able to:	ation and enforcemen	control t – Envin 9 Preventi	ion	rts - nent	- tal
Air Zon Imp Uni Sour	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality it V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urse Outcomes: on completion of this course, the students will be able to:	ation and enforcemen	control t – Envin 9 Preventi	ion	rts - nent	- tal
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Air Zon Imp Uni Sour Cou CO1 CO2	• quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality • it V NOISE POLLUTION • urces of noise pollution – Effects – Assessment - Standards • urse Outcomes: • on completion of this course, the students will be able to: • 1 : • Causes of air pollution • 2 :	ation and enforcemen	control t – Envin 9 Preventi	ion	rts - nent	- tal
Air of Zon Imp Uni Sour Cou CO1 CO2	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality iit V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urree Outcomes: on completion of this course, the students will be able to: 1 : Causes of air pollution 2 : Effects of air and noise pollution '2 : Effective air pollution management	ation and enforcemen	control t – Envin 9 Preventi	ion	rts - nent	- tal
Air of Zon Imp Uni Sour Sour Upo CO1 CO2 CO3 Tex	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality iit V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urse Outcomes: on completion of this course, the students will be able to: 1 : Causes of air pollution 2 : Effects of air and noise pollution 23 : Effective air pollution management xt Books:	ation and enforcement	control t – Envin 9 Preventi Total =	ion 45	rts - nent + Peri	- tal
Air Zon Imp Uni Sour Cou CO1 CO2 CO3 Tex 1.	• quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality • it V NOISE POLLUTION • urces of noise pollution – Effects – Assessment - Standards • urse Outcomes: • on completion of this course, the students will be able to: • 1 : • Causes of air pollution • 2 : • Effects of air and noise pollution • 3 : • Effective air pollution management • xt Books: • Anjaneyulu, D., Air Pollution and Control Technologies, A	ation and enforcements - Control methods -	control t – Envin 9 Preventi Total = ai,	conn ion : 45	rts - nent + Peri	- tal
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Air of Zon Imp Uni Sour Upo CO1 CO2 CO3 Tex 1. 2. Refe 1.	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality iit V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urree Outcomes: on completion of this course, the students will be able to: 1 : Causes of air pollution 2 : Effects of air and noise pollution 2 : Effective air pollution management xt Books: Anjaneyulu, D., Air Pollution and Control Technologies, A Rao, C.S., Environmental Pollution Control Engineering, V ference Books: RaoM.N., and Rao H. V. N., Air Pollution Control, Tata-Monitor	ation and enforcement – Control methods - lliedPublishers,Mumb Viley Eastern Ltd., New Graw-Hill, New Delhi	control t – Envin 9 Preventi Total = ai, w Delhi, , 1996.	conn ion : 45	rts - nent + Peri	- tal
Air Zon Imp Uni Sour Sour Upo CO1 CO2 CO3 Tex 1. 2. Ref	r quality standards – Air quality monitoring – Preventive moning – Town planning regulation of new industries – Legisl pact Assessment and Air quality iit V NOISE POLLUTION urces of noise pollution – Effects – Assessment - Standards urrse Outcomes: on completion of this course, the students will be able to: 1 : Causes of air pollution 2 : Effects of air and noise pollution 2 : Effective air pollution management xt Books: Anjaneyulu, D., Air Pollution and Control Technologies, A Rao, C.S., Environmental Pollution Control Engineering, V ference Books: RaoM.N., and Rao H. V. N., Air Pollution Control Systems, N	ation and enforcement – Control methods - lliedPublishers,Mumb Viley Eastern Ltd., New Graw-Hill, New Delhi IcGraw-Hill, New Yor	control t – Envin 9 Preventi Total = ai, w Delhi, k, 1996.	conn ion = 45 2001 199	rts - nent + Peri	- tal
Air (Zon Imp Sour Sour CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2 CO2	Image: Provide the standards of the standar	ation and enforcement – Control methods - lliedPublishers,Mumb Viley Eastern Ltd., New Graw-Hill, New Delhi AcGraw-Hill, New Yor a McGraw-Hill Publis	control t – Envin Preventi Total = ai, w Delhi, , 1996. k, 1997 ning Cor	conn ion : 45 2000 199 npan	Peri	- tal
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CO/ PO	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	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

	SCEPE11	MUNICIPAL SOLID WASTE MANAGEMENT	L	Т	Р	С
Cor	urse Objeo	tiyos	3	0	0	3
1.	-	ject covers the various sources and characterisation of municipal solid w	vaste	s an	d th	e
	on-site/	off-site processing of the same and the disposal methods.				
2.	solidwas			e mı	unic	р
3.	Provide	efficient and economical refuse collection, recycling, and disposal services	s.			
Un	it I SO	JRCES AND TYPES OF MUNICIPAL SOLID WASTES	9		+	0
cha was	racteristics stes – publi	vpes of solid wastes - Quantity – factors affecting generation of solid wastes s – methods of sampling and characterization-Effects of improper disposa c health effects. Principle of solid waste management – social & economic as ess- Role of NGOs- Legislation.	al of		d	
Un	it II ON-	SITE STORAGE & PROCESSING	9		+	0
hea		e methods – materials used for containers – on-site segregation of solid v omic aspects of storage – options under Indian conditions – Critical Evalu				lic
Un	it III C	OLLECTION AND TRANSFER	9		+	0
		ection – types of vehicles – Manpower requirement – collection routes- ection of location, operation & maintenance; options under Indian condition		fer		
Un	it IV OF	F-SITE PROCESSING	9		+	0
		chniques and Equipment; Resource recovery from solid wastes – compost Pyrolysis - options under Indian conditions.	ting,			
Un	it V DISI	POSAL	9		+	0
		blid waste; sanitary lands fills – site selection, design and operation of san	nitar	y la	ndfi	ls
		llection & treatment.				
			tal -	45	Dori	ode
Сот	urse Outco	То	otal =	45	Peri	ods
	urse Outco	То	tal =	45	Peri	ods
	on complet	To Dmes:	tal =	45	Peri	ods
Upo CO CO	on complet 1 : So 2 : 0	To omes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods		45	Peri	ods
Upo CO CO CO	on complet 1 : So 2 : O 3 : E	To mes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes		45	Peri	ods
Upo CO CO CO	on complet 1 : So 2 : O 3 : E xt Books: E	To omes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods fective municipal solid waste management	S.		Peri	ods
Upo CO CO CO	on complet 1 : So 2 : O 3 : E xt Books: George To	To omes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods	S.		Peri	ods
Upo CO CO Tex 1.	on complet 1 : So 2 : O 3 : E xt Books: George To	To omes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods ffective municipal solid waste management chobanoglousetc.al., <i>Integrated Solid Waste Management</i> , McGraw-Hill,Publi 293.	S.		Peri	ods
Up0 CO CO Tex 1. Ref 1.	on complet 1 : So 2 : O 3 : E xt Books: George To 1 th ference Bo B.Bilitew S	To Domes: ion of this course, the students will be able to: purces and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods fective municipal solid waste management chobanoglousetc.al., <i>Integrated Solid Waste Management</i> , McGraw-Hill,Publi 293. oks: ski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, <i>WasteManager</i> pringer, 1994.	s. sher: ment	S,	Peri	ods
Upd CO CO Te 1. Ref 1. 2.	n complet 1 : So 2 : O 3 : E xt Books: George T 1' ference Bo B.Bilitew S] Manual o Governm	To omes: ion of this course, the students will be able to: ources and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods fective municipal solid waste management chobanoglousetc.al., <i>Integrated Solid Waste Management</i> , McGraw-Hill,Publi 293. oks: ski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, <i>WasteManager</i> pringer, 1994. <i>n Municipal Solid Waste Management</i> , CPHEEO, Ministry of Urban Develor ent of India,NewDelhi, 2000	s. sher: ment	S,	Peri	ods
Up0 CO CO Tex 1. Ref 1.	on complet 1 : So 2 : O 3 : E ct Books: George To 1' ference Bo B.Bilitew So Manual o Governm R.E.Landu P	To Domes: ion of this course, the students will be able to: burces and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods fective municipal solid waste management chobanoglousetc.al., <i>Integrated Solid Waste Management</i> , McGraw-Hill,Publi 2093. oks: ski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, <i>WasteManager</i> pringer, 1994. <i>n Municipal Solid Waste Management</i> , CPHEEO, Ministry of Urban Develo ent of India,NewDelhi, 2000 reth and P.A.Rebers, <i>Municipal Solid Wastes - problems and Solutions</i> ,Lewis ublishers, 1997	s. sher: ment	, , , ent,		ods
Upo CO CO Tex 1. Ref 1. 2.	on complet 1 : So 2 : O 3 : E xt Books: George To 1 th ference Bo B.Bilitew So <i>Manual o</i> Governm R.E.Landn P Peavy S.V D	To Demes: ion of this course, the students will be able to: burces and characterization of municipal solid wastes n-site/off-site processing of municipal solid wastes and disposal methods fective municipal solid waste management chobanoglousetc.al., <i>Integrated Solid Waste Management</i> , McGraw-Hill,Publi 293. oks: ski, G.HardHe, K.Marek, A.Weissbach, and H.Boeddicker, <i>WasteManager</i> pringer, 1994. <i>n Municipal Solid Waste Management</i> , CPHEEO, Ministry of Urban Develo ent of India,NewDelhi, 2000 reth and P.A.Rebers, <i>Municipal Solid Wastes - problems and Solutions</i> ,Lewis	s. sher: ment	, , , ent,		ods

CO/P 0	P01	PO2	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3
C01		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

18CEPE	12 MARINE POLLUTION MONITORING AND CONTROL	L	Т	Р	С
_		3	0	0	3
	Objectives:				
	s subject educated the students about Coastal and Marine environment, or crces of marine pollution and methods for monitoring, modeling and control		ynar	nics	,
2. The	e subject deals with the method for monitoring the marine pollution.				
3. The	e subject cover modelling and controlling methods of marine pollution.				
Unit I	MARINE ENVIRONMENT	9		+	0
	oceans, Continental area, Coastal zone, Properties of sea water, Principles Geology, coastal features –Beaches, Estuaries, Lagoons– The oceans andclim				
Unit II	OCEAN HYDRODYNAMICS	9		+	0
for deep General	eory, Waves in shallow waters –Refraction, Diffraction and Shoaling, Approx and shallow water conditions –Tidal Classification- circulation of ocean waters-Ocean currents -Coastal sediment transport - offshore sediment transport -Beach formation and coastal processes -Tsunam				
	Nino effect.				
Unit III	MARINE POLLUTION SOURCES AND EFFECTS	9		+	0
Explorat	of Marine Pollution –Point and non-point sources, Pollution caused by Oil ion, Dredging, Offshore Structures, Agriculture Impacts of pollution onwater nd coastal ecosystems –Marine discharges and effluent standards				
Unit IV	MONITORING OF MARINE POLLUTION	9		+	0
GPS –Me –Modelir	easurements -Sounding boat, lead lines, echo sounders –current meters -tid asurement of coastal water characteristics –sea bed sampling og of Pollutant transport and dispersion -Oil Spill Models -Ocean Monitoring ons of Remote Sensing and GIS in monitoring marine pollution				of
Unit V	MARINE POLLUTION CONTROL AND ICZM	9		+	0
Design o Internati	f out falls -Pollution Control strategies –Selection of optimal Outfall locations – onal Treaties, Coastal Zone Regulation–Total Maximum Daily Load applicati e Pollution – ICZM and Sustainable Development			nd	-
	Ţ	otal =	45	Peri	ods
	Dutcomes:				
-	npletion of this course, the students will be able to:				
C01	: Abilitytoknowaboutmarineenvironmentandwouldhavelearntthephysicalco behind the oceanic curents and natural processes of various activities ha the marineenvironment.				
CO2	: Acquired knowledge on the marine pollution and the effect of the same of	on the	ecol	ogy	
CO3	: Should have gained knowledge on remote sensing and various other tec for measuring and monitoring oceanic environmentparameters				
CO 4	: Should have acquired knowledge on control of marine pollution and sus development	tainal	ole		
Text Bo					
	ine Pollution (5thEdition) R.B. Clark, C. Frid and M Atttrill Oxford Science P	ublica	tion		
I. Mai	ine romation (3° Eardon) isb. clark, c. rina and M Attuini Oxiora Science P	ubille		<i>,</i>	

	2001
2.	Marine pollution Dr.P.C.Sinha ,Anmol Publications Pvt. Ltd, 1998
Ref	erence 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/P O	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	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

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	irse Obje											
1.			with the var							pone	ents	of
2			nethod of as									
2.	environ	ment and t	cted to knov ne mitigating	g measures	6.	-		-				
3.			vith to ident velopment a		t and eva	aluate th	le econo	omic, env	vironme	ntal	and	
Uni	t I IN	RODUCTI	ON							9		+
Asse		EIA) - Envi	projects und ronmental II									
Uni	t II ME	HODOLO	GIES							9		+
	hods of E e studies	A –Check l	ists – Matrio	es – Netwo	orks – Co	ost-bene	fit analy	vsis – An	alysis o	f alte	ernat	tives
Uni	t III P	REDICTIO	N AND ASS	ESSMENT						9		+
	essment o						lflowe	nd farme	- Math	-	ical	
				ano air noi	ise socia	l cultura	н пога а	no iauna				
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			tion – Rapid		ise, socia	l, cultura	ai nora a	na launa	- Matin			
moc	dels- publi	c participa		EIA.		l, cultura				9		+
mod Uni Plan	t IV EN	c participation of adv	tion – Rapid	EIA. GEMENT I on environ	PLAN ment – c	options fo	or mitig	ation of i	mpact of	9 on wa	ater,	air
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mod Uni Plan and Uni	t IV EN for mitig land, flor	c participa VIRONMEN ation of adv a and fauna E STUDIE	tion – Rapid T AL MANA erse impact a; Addressin S	EIA. GEMENT I on environ g the issue	PLAN ment – c s related	options fo l to the l	or mitig Project	ation of i Affected	mpact o People	9 on wa – IS 9	ater, 0 14	air 000
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mod Uni Plar and EIA Wat Cou Upo	t IV EN for mitig land, flor t V CAS for infras ter Supply urse Outcon on comple	c participa VIRONMEN ation of adva a and fauna E STUDIE tructure pr and Drain omes: ion of this	tion – Rapid TAL MANA erse impact a; Addressin S ojects – Brid age Projects course, the	EIA. GEMENT I on environ g the issue lges – Stad students w	PLAN ment – c s related ium – H rill be ab	options fo l to the l ighways le to:	or mitig Project	ation of i Affected 5 – Multi	mpact o People -storey	9 on wa – IS 9 Buile	ater, O 14 dings	air 0000 + 5 -
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CO/P O	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	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

	Т	P	С
3	0	0	3
Course Objectives:			
1. To impart an understanding of systems approach to Environmental Manage ISO 14001 and skills for environmental performance in terms of legal complia prevention and continual improvement.			
Unit I ENVIRONMENTAL MANAGEMENT STANDARDS			
JIILI ENVIKONMENTAL MANAGEMENT STANDARDS	9	+	0
Unique Characteristics of Environmental Problems - Systems approach to Corporate e management - Classification of Environmental Impact Reduction Efforts - Busines Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers -Evolution of Environmental Stewardship – Environmental Management National policies on environment, abatement of pollution and conservation of resource	ss Ch : Pri	arte	er for
Unit II PREVENTIVE ENVIRONMENTAL MANAGEMENT	9	+	0
Clean technology, closing the loops, zero discharge technologies Four Stages and nine approaches of Pollution Prevention -Getting management commi Analysis of Process Steps-source reduction, raw material substitution, toxic use reduct elimination, process modification – material balance – Technical, economical and enviro Feasibility evaluation of Pollution Prevention options in selected industries –Preventive Environmental Management over Product cycle.	ion a nme	and ntal	
JIIUIII ENVIRONMENTAL MANAGEMENT SISTEM	9	+	0
EMS, ISO 14000 - EMS as per ISO 14001-benefits and barriers of EMS – Concept mprovement and pollution prevention - environmental policy – initial environment environmental aspect and impact analysis – legal and other requirements-objectiv -environmental management programs –structure and responsibility –training av competence-communication –documentation and document control – operational control –monitoring and measurement –management review.	ital 1 es ar	evie nd ta	ew – rgets
Unit IV ENVIRONMENTAL AUDIT	9	+	0
	-	-	0
audit results – audit reports – case studies.			
audit results – audit reports – case studies.	9	+	0
audit results – audit reports – case studies. Unit V APPLICATIONS	-		0 ental
audit results – audit reports – case studies.	ology	onmo f	ental

Cor	irse Outcomes:
	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.
Tex 1.	t Books: 1.Christopher Sheldon and Mark Yoxon, "Installing Environmental management Systems –a
<u> </u>	step by step guide" Earthscan Publications Ltd, London, 1999.
2.	ISO 14001/14004: Environmental management systems –Requirements and Guidelines – International Organisation for Standardisation, 2004.
Ref	erence 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	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3
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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 1 INTRODUCTION TO DISASTERS 9 + 0 Definition: Disaster, Hazard, Vulnerability, Resilience, Risks – Disasters: Types of disasters – Earthquak andslide, Flood, Drought, Fire etc - Classification, Causes, Impacts in terms of caste, class, gender, ag ocation, disability- Global trends in disasters: urban disasters, pandemics, zomplex 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 DRI structural - nonstructural measures, Roles and responsibilities of - community, Panchayati R nstitutions/Urban Local Bodies (PRIs/ULBs), States, Centre, and other stake-holders- Institution Processes and Framework at State and Central Level- State Disaster Management Authority(SDMA) - Early Warning System – Advisories from Appropriate Agencies. Unit II INTER-RELATIONSHIP BETWEEN DISASTERS AND DEVELOPMENT 9 + 0 Factors affecting Vulnerabilities, differential impacts, impact of Development projects such as dam embankments, changes in Land-use etc Climate Change Adaptation - IPCC Scenario and Scenarios the context of India - Relevance of indigenous knowledge, appropriate technology	Cours 1. 1 2. 1 3. 1			3	0	0	3
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Course Outcomes		0.0			rj r	CII	Ju
Course Outcomes:	Co						

Upo	n co	mpletion of this course, the students will be able to:
C01	L	Differentiate the types of disasters, causes and their impact on environment and society
CO2	2	Assess vulnerability and various methods of risk reduction measures as well as mitigation
CO3	3	Draw the hazard and vulnerability profile of India, Scenarious in the Indian context,
		Disaster damage assessment and management.
Tex	t Bo	oks:
1.	Sin	ghal J.P. "Disaster Management", Laxmi Publications, 2010. ISBN-10: 9380386427 ISBN-13:
1.		978-9380386423
2.	Tu	har Bhattacharya, "Disaster Science and Management", McGraw Hill India Education Pvt.
۷.		Ltd., 2012. ISBN-10: 1259007367, ISBN-13: 978-1259007361]
Ref	eren	ce Books:
1.	Go	rt. of India: Disaster Management Act , Government of India, New Delhi, 2005
2.	Gov	ernment of India, National Disaster Management Policy,2009.

CO/	P01	P02	P03	P04	P05	P06	P07	P08	P09	P010	P011	P012	PSO1	PSO2	PSO3
PO															
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

COURSE OBJECTIVES: Students will be able to:

1. Learn to demonstrate a critical understanding of key concepts in disaster risk reduction and humanitarian response

DISASTER MANAGEMENT

- 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

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**

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**

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

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**

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**

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

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

TEXT BOOKS:

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

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Total= 24 Periods

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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

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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.

Syllabu <u>Units</u> 1	s CONTENTS Introduction Disaster: Definition, Factors And Significance; Difference Between Hazard And Disaster; Natural And Manmade Disasters: Difference, Nature, Types And Magnitude.	Hours 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.