GE 6351 ENVIRONMENTAL SCIENCE AND ENGINEERING

SUBJECT DESCRIPTION AND OBJECTIVES

DESCRIPTION:

It deals with the structure and function of the environment, problems created in it and solution for such problems. The aim of this course is to create awareness in every engineering graduate about the importance of environment, the effect of technology on the environment and ecological balance and make them sensitive to the environment problems in every professional endeavour that they participates.

OBJECTIVES:

At the end of this course the student is expected to understand what constitutes the environment, what are precious resources in the environment, how to conserve these resources, what is the role of a human being in maintaining a clean environment and useful environment for the future generations and how to maintain ecological balance and preserve bio-diversity. The role of government and non-government organization in environment managements.

MICRO LESSON PLAN

Week	HOURS	LECTURE TOPIC	READING
UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY			
I	1	Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment.	T1
	2	concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers	T1
	3	Oxygen cycle and Nitrogen cycle – energy flow in the ecosystem – ecological succession processes – Introduction, types, characteristic features, structure and function of the (a) forest ecosystem (AV Class)	T1
	4	(b) grassland ecosystem (c) desert ecosystem (d)aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)	T1
	5	Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical classification of India	T1
II	6	value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values	T1
	7	Biodiversity at global, national and local levels – India as a mega-diversity nation	T1
	8	hot-spots of biodiversity (AV Class)	T1
	9	threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts	T1
	10	endangered and endemic species of India	T1
III	11	Conservation of biodiversity: In-situ and ex-situ conservation of biodiversity.	T1
	12	Field study of common plants, insects, birds Field study of simple ecosystems – pond, river, hill slopes, etc.	T1
UNIT II ENVIRONMENTAL POLLUTION			
III	13	Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere	T1
	14	Formation of smog, PAN, acid rain, oxygen and ozone chemistry. (AV Class)	T1
	15	Mitigation procedures- Control of particulate and gaseous emission, Control of SO_2, NO_X, CO and HC)	T1
	16	(b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance;	T1
	17	Water quality parameters – physical, chemical and biological; absorption of heavy metals - Water treatment processes.	T1
IV	18	c) Soil pollution - soil waste management: causes, effects and control measures of municipal solid wastes	T1
	19	(d) Marine pollution (e) Noise pollution (AV Class)	T1
	20	(f) Thermal pollution	T1
	21	(g) Nuclear hazards–role of an individual in prevention of pollution	T1
	22	Pollution case studies –Field study of local polluted site – Urban / Rural / Industrial / Agricultural.	T1

UNIT III NATURAL RESOURCES			
V	23	Forest resources: Use and over-exploitation, deforestation, case studies	T1
	24	timber extraction, mining, dams and their effects on forests and tribal people	T1
	25	Water resources: Use and overutilization of surface and ground water, dams-benefits and problems	T1
	26	Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies (AV Class)	T1
	27	Food resources: World food problems, changes caused by agriculture and overgrazing,	T1
VI	28	effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies	T1
	29	Energy resources: Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Energy Conversion processes	T1
	30	Biogas – production and uses, anaerobic digestion; case studies	T1
	31	Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification – role of an individual in conservation of natural resources – Equitable use of resourcesfor sustainable lifestyles. (AV Class)	T1
	32	Introduction to Environmental Biochemistry: Proteins –Biochemical degradation of pollutants, Bioconversion of pollutants. Field study of local area to document environmental assets – river / forest / grassland / hill /mountain.	T1
UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT			
VII	33	From unsustainable to sustainable development – Urban problems related to energy-water conservation, rain water harvesting, watershed management	T1
	34	Resettlement and rehabilitation of people; its problems and concerns, case studies – Role of non-governmental organization Environmental ethics: Issues and possible solutions	T1
	35	12 Principles of green chemistry- nuclear accidents and holocaust, case studies. Wasteland reclamation – Consumerism and waste products (AV Class)	T1
	36	Environment production act – Air act – Water act – Wildlife protection act – Forest conservation act	T1
VIII	37	The Biomedical Waste (Management and Handling) Rules; 1998 and amendments-scheme of labeling of environmentally friendly products (Ecomark).	T1
	38	enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods,	T1
	39	Earthquake, cyclone and landslides. Public awareness. (AV Class)	T1
UNIT V HUMAN POPULATION AND THE ENVIRONMENT			
IX	40	Population growth, variation among nations – population explosion	T1
	41	Family welfare programme (AV Class)	T1
	42	Environment and Human Health, Human Rights -value education	T1
X	43	HIV / AIDS Women and Child welfare(AVClass)	T1
	44	Environmental impact analysis (EIA)- -GIS-remote sensing	T1
	45	Role of information Technology in Environment and human health.– Case studies	T1

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