**GE8291 ENVIRONMENTAL SCIENCE AND ENGINEERING L T P C**

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**OBJECTIVES:**

* To the study of nature and the facts about environment.
* To find and implement scientific, technological, economic and political solutions to environmental problems.
* To study the interrelationship between living organism and environment.
* To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
* To study the dynamic processes and understand the features of the earth‘s interior and surface.
* To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

**UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY 14**

Definition, Scope and Importance of Environment – Need for Public Awareness - Concept of an Ecosystem – Structure and Function of an Ecosystem – Producers, Consumers and Decomposers – Energy Flow in the Ecosystem – Ecological Succession – Food Chains, Food Webs and Ecological Pyramids – Introduction, Types, Characteristic Features, Structure and Function of the (A) Forest Ecosystem (B) Grassland Ecosystem (C) Desert Ecosystem (D) Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Oceans, Estuaries) – Introduction to Biodiversity Definition: Genetic, Species and Ecosystem Diversity – Bio geographical Classification of India – Value of Biodiversity: Consumptive Use, Productive Use, Social, Ethical, Aesthetic and Option Values – Biodiversity at Global, National and Local Levels – India as a Mega-Diversity Nation – Hot-Spots of Biodiversity – Threats to Biodiversity: Habitat Loss, Poaching of Wildlife, Man-Wildlife Conflicts – Endangered and Endemic Species of India – Conservation of Biodiversity: In-Situ and Ex-Situ Conservation of Biodiversity.

* Field Study of Common Plants, Insects, Birds
* Field Study of Simple Ecosystems – Pond, River, Hill Slopes, etc

**UNIT II ENVIRONMENTAL POLLUTION 8**

Definition – Causes, Effects and Control Measures of: (A) Air Pollution (B) Water Pollution (C)Soil Pollution (D) Marine Pollution (E) Noise Pollution (F) Thermal Pollution (G) Nuclear Hazards – Soil Waste Management: Causes, Effects and Control Measures of Municipal Solid Wastes – Role of an Individual in Prevention of Pollution – Pollution Case Studies – Disaster Management: Floods, Earthquake, Cyclone and Landslides.

* Field Study of Local Polluted Site – Urban / Rural / Industrial / Agricultural.

**UNIT III NATURAL RESOURCES 10**

Forest Resources: Use and Over-Exploitation, Deforestation, Case Studies - Timber Extraction, Mining, Dams and Their Effects on Forests and Tribal People – Water Resources: Use and Over-Utilization of Surface and Ground Water, Floods, Drought, Conflicts Over Water, Dams-Benefits and Problems – Mineral Resources: Use and Exploitation, Environmental Effects of Extracting and Using Mineral Resources, Case Studies – Food Resources: World Food Problems, Changes Caused by Agriculture and Overgrazing, Effects of Modern Agriculture, Fertilizer-Pesticide Problems, Water Logging, Salinity, Case Studies – Energy Resources: Growing Energy Needs, Renewable and Non Renewable Energy Sources, Use of Alternate Energy Sources. Case Studies – 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 Resources for Sustainable Lifestyles.

* Field Study of Local Area to Document Environmental Assets – River / Forest / Grassland / Hill / Mountain.

**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT 7**

From Unsustainable to Sustainable Development – Urban Problems Related to Energy – Water Conservation, Rain Water Harvesting, Watershed Management – Resettlement and Rehabilitation of People; its Problems and Concerns, Case Studies – Role of Non-Governmental Organization- Environmental Ethics: Issues and Possible Solutions – Climate Change, Global Warming, Acid Rain, Ozone Layer Depletion, Nuclear Accidents a nd Holocaust, Case Studies. – Wasteland Reclamation – Consumerism and Waste Products – Environment Production Act– Air (Prevention And Control Of Pollution) Act – Water (Prevention And Control Of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Enforcement Machinery Involved in Environmental Legislation- Central and State Pollution Control Boards- Public Awareness.

**UNIT V HUMAN POPULATION AND THE ENVIRONMENT 6**

Population Growth, Variation Among Nations – Population Explosion – Family Welfare Programme – Environment and Human Health – Human Rights – Value Education – HIV / AIDS – Women and Child Welfare – Role of Information Technology in Environment and Human Health – Case Studies.

**TOTAL: 45 PERIODS**

**OUTCOMES:**

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

Environmental Pollution or problems cannot be solved by mere laws. Public participation is an important aspect which serves the environmental Protection. One will obtain knowledge on the following after completing the course.

* Public awareness of environment at infant stage.
* Ignorance and incomplete knowledge has lead to misconceptions.
* Development and improvement in standard of living has lead to serious environmental disasters.

**TEXT BOOKS:**

1. Gilbert M. Masters, ―Introduction to Environmental Engineering and Science‖, Second Edition, Pearson Education 2004.
2. Benny Joseph, ―Environmental Science and Engineering‖, Tata McGraw-Hill, 2006.

**REFERENCES:**

1. R.K. Trivedi, ―Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards‖, Vol. I and II, Enviro Media.
2. Cunningham, W.P. Cooper, T.H. Gorhani, ‗Environmental Encyclopedia‘, Jaico Publishing, 2001.
3. Dharmendra S. Sengar, ―Environmental law‖, Prentice Hall, 2007.
4. Rajagopalan.R, ―Environmental Studies-From Crisis to Cure‖, Oxford University Press 2005.