

## **AMEV-06 ENVIRONMENTAL SCIENCE AND ENGINEERING**

### **OBJECTIVES:**

To the study of nature and the facts about environment.

- 1 To finding and implementing scientific, technological, economic and political solutions to environmental problems.
- 2 To study the interrelationship between living organism and environment.
- 3 To appreciate the importance of environment by assessing its impact on the human world; envision the surrounding environment, its functions and its value.
- 4 To study the dynamic processes and understand the features of the earth's interior and surface.
- 5 To study the integrated themes and biodiversity, natural resources, pollution control and waste management.

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

Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment – concept of an ecosystem – structure and function of an ecosystem – producers, consumers and decomposers-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 (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries) – Introduction to biodiversity definition: genetic, species and ecosystem diversity – biogeographical 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**

Definition – causes, effects and control measures of: (a) Air pollution (Atmospheric chemistry-Chemical composition of the atmosphere; Chemical and photochemical reactions in the atmosphere – formation of smog, PAN, acid rain, oxygen and ozone chemistry;- Mitigation procedures- Control of particulate and gaseous emission, Control of SO<sub>2</sub>, NO<sub>x</sub>, CO and HC) (b) Water pollution : Physical and chemical properties of terrestrial and marine water and their environmental significance; Water quality parameters – physical, chemical and biological; absorption of heavy metals – Water treatment processes. (c) Soil pollution – soil waste management: causes, effects and control measures of municipal solid wastes – (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution – pollution case studies – Field study of local polluted site – Urban / Rural / Industrial / Agricultural.

### **UNIT III NATURAL RESOURCES**

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 overutilization of surface and ground 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. Energy Conversion processes - Biogas - production and uses, anaerobic digestion; 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. 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.

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

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 - 12 Principles of green chemistry- nuclear accidents and holocaust, case studies. - wasteland reclamation - consumerism and waste products - environment production act - Air act - Water act - Wildlife protection act - Forest conservation act -The Biomedical Waste (Management and Handling) Rules; 1--8 and amendments- scheme of labeling of environmentally friendly products (Ecomark). enforcement machinery involved in environmental legislation- central and state pollution control boards-disaster management: floods, earthquake, cyclone and landslides. Public awareness.

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

Population growth, variation among nations - population explosion - family welfare programme - environment and human health - human rights - value education - HIV / AIDS - women and child welfare -Environmental impact analysis (EIA)- -GIS-remote sensing-role of information technology in environment and human health - Case studies.

#### **OUTCOMES:**

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.

- 1 Public awareness of environmental is at infant stage.
- 2 Ignorance and incomplete knowledge has lead to misconceptions
- 3 Development and improvement in std. of living has lead to serious environmental disasters

#### **TEXT BOOKS :**

- 1 Gilbert M.Masters, „Introduction to Environmental Engineering and Science“, 2<sup>nd</sup> edition, Pearson Education,2004
- 2 Benny Joseph, „Environmental Science and Engineering“, Tata McGraw Hill, New Delhi, 2006.

#### **REFERENCES :**

1. Trivedi R.K. „Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards“, Vol. I and II, Enviro Media. Cunningham, W.P.Cooper., T.H. Gorhani, „Environmental Encyclopedia“, Jaico Publishing House, Mumbai, 2001. Dharmendra S. Sengar, „Environmental law“, Prentice hall of India PVT LTD, New

Delhi, 2007.  
Rajagopalan. R, „Environmental Studies - From Crisis to Cure“, Oxford  
University Press, 2005.