AMTE-2 ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT-1 ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

1.1 Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards, Biological hazards in the environment

1.2 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

1.3 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)

1.4 Introduction to biodiversity definition: genetic, species and ecosystem diversity- biogeographically classification of India- value of biodiversity:

1.5 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:

1.6 Habitat loss, poaching of wildlife, man-wildlife conflicts- endangered and endemic species of India- conservation of biodiversity:

1.7 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-2 ENVIRONMENTAL POLLUTION

2.1 Definition- causes, effects and control measures of:

2.2 (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;-

2.3 Mitigation procedures- Control of particulate and gaseous emission, Control of SO_2, NO_x, CO and HC)

2.4 (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.

2.5 (c) Soil pollution- soil waste management: causes, effects and control measures of municipal solid wastes

2.6 (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-3 NATURAL RESOURCES

3.1 Forest resources: Use and over-exploitation, deforestation, case studies- timber extraction, mining, dams and their effects on forests and tribal people

3.2 Water resources: Use and overutilization of surface and ground water, dams-benefits and problems

3.3 Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies

3.4 Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies

3.5 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

3.6 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.

3.7 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-4 SOCIAL ISSUES AND THE ENVIRONMENT

4.1 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:

4.2 Issues and possible solutions- 12 Principles of green chemistry- nuclear accidents and holocaust, case studies.- wasteland reclamation- consumerism and waste products

4.3 Environment production act- Air act- Water act- Wildlife protection act- Forest conservation act

4.4 The Biomedical Waste (Management and Handling) Rules; 1998 and amendments- scheme of labeling of environmentally friendly products (Ecomark).

4.5 Enforcement machinery involved in environmental legislation- central and state pollution control boards- disaster management: floods, earthquake, cyclone and landslides. Public awareness.

UNIT-5 HUMAN POPULATION AND THE ENVIRONMENT

5.1 Population growth, variation among nations- population explosion

5.2 Family welfare programmed- 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.

References Books

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 Publ., House, Mumbai, 2001.