AMPE18 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- concept of an ecosystem-

1.2 Structure and function of an ecosystem- producers, consumers and decomposers-Oxygen cycle and Nitrogen cycle- energy flow in the ecosystem- ecological succession

1.3 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)-

1.4 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-

1.5 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-

1.6 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, and hill slopes, etc.

UNIT-2 ENVIRONMENTAL POLLUTION

2.1 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 SO2, NOX, CO and HC)

2.2 (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.

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

2.4 (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- Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies-

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

3.4 Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.

3.5 Energy Conversion processes- Biogas- production and uses, anaerobic digestion;

3.6 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-

3.7 Equitable use of resources for sustainable lifestyles. Introduction to Environmental

3.8 Biochemistry: Proteins- Biochemical degradation of pollutants, Bioconversion of pollutants.

3.9 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-

4.2 Resettlement and rehabilitation of people; its problems and concerns, case studies- role of non-governmental organization- environmental ethics:

4.3 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-

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

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

UNIT-5 HUMAN POPULATION AND THE ENVIRONMENT

5.1 Population growth, variation among nations- population explosion- family welfare programme-environment and human health- human rights- value education

5.2 HIV / AIDS- women and child welfare- Environmental impact analysis (EIA)

5.3 GIS- remote sensing-role of information technology in environment and human health

References Book:

1. R.K. Trivedi, 'Handbook of Environmental Laws, Rules, Guidelines, Compliances and Standards', Vol. I and II, Enviro Media.