

AMSD16 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 SO₂, 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.