

AMEV06 ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT I ENVIRONMENT, ECOSYSTEMS AND BIODIVERSITY

- 1.1 Definition, scope and importance of Risk and hazards; Chemical hazards, Physical hazards,
- 1.2 Biological hazards in the environment- concept of an ecosystem- structure and function of an ecosystem- producers, consumers and decomposers
- 1.3 Oxygen cycle and Nitrogen cycle- energy flow in the ecosystem- ecological succession processes- Introduction, types, characteristic features, structure and function of the
- 1.4 (a) forest ecosystem (b) grassland ecosystem (c) desert ecosystem (d) aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)
- 1.5 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
- 1.6 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
- 1.7 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-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; Mitigation procedures- Control of particulate and gaseous emission, Control of SO₂, NOX, CO and HC)
- 2.3 (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.
- 2.4 (c) Soil pollution- soil waste management: causes, effects and control measures of municipal solid wastes
- 2.5 (d) Marine pollution (e) Noise pollution (f) Thermal pollution (g) Nuclear hazards–role of an individual in prevention of pollution- pollution case studies
- 2.6 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,
- 3.4 Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity,

- 3.5 Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources.
- 3.6 Energy Conversion processes- Biogas- production and uses, anaerobic digestion; 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- resettlement and rehabilitation of people; its problems and concerns, case studies
- 4.2 Role of non-governmental organization-environmental ethics: Issues and possible solutions,
- 4.3 Principles of green chemistry- nuclear accidents and holocaust, 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. Public awareness.

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
- 5.3 Environmental impact analysis (EIA)
- 5.4 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, Cunningham, W.P. Cooper, T.H. Gorhani, 'Environmental Encyclopedia', Jaico Publ., House, Mumbai, 2001.