

CORE COURSE XIV – ENVIRONMENTAL BIOTECHNOLOGY

UNIT - I

Basic Concepts: Interactions between environment and biota; Concept of habitat and ecological niches; Limiting factor; Ecosystem dynamics and management: Stability and complexity of ecosystems; Energy flow, food chain, food web and trophic levels; Ecological pyramids and recycling, biotic community-concept, structure, dominance, fluctuation and succession; N.P.C and S cycles in nature.-Population ecology - community structure-; Principles of conservation; Speciation and extinctions Conservation strategies; sustainable development. - environmental impact assessment.

Unit II

Environmental Pollution: Water Pollution: sources of pollution and pollutants .Industrial effluents, Domestic wastes . Agrochemical . Heavy metals . Effects of Water pollution, prevention and control of water pollution. Water pollution analysis and monitoring. **Soil pollution-** sources, effects and its control. **Air pollution-** sources, air pollutants, effects, control measures. Ozone depletion, global warming. Air pollution analysis and monitoring- **Noise pollution, Radioactive pollution, Thermal pollution:** their Sources, effects, prevention and control measures.

UNIT -III

Bioremediation and Bio-leaching: Environmental impact of pollution and measurement methods -Composting of organic wastes, microbial bioremediation of oil spills; Waste water treatment - sewage treatment and common industrial effluent treatment ; Concepts of bioremediation (in-situ and ex-situ), Bioremediation of toxic metal ions – biosorption and bioaccumulation principles. Concepts of phytoremediation; Microbial biotransformation of pesticides and xenobiotics; Microbial leaching of ores – direct and indirect mechanisms.

UNIT -IV

Biofertilizers and Biopesticides: Biofertilizers and their importance in crop productivity; Algal and fungal (mycorrhizae) biofertilizers Bacterial biofertilizers (rhizobial, free living N₂ fixers and phosphate solubilizing bacteria), their significance and practice; Biopesticides : Bacterial (Bt pesticides), fungal (Trichoderma); Viral biopesticides – Baculovirus, NPV insecticides; Production of biofertilizers and biopesticides for large scale application.

UNIT -V

Genetic Engineering in Environmental Biotechnology: Genetically engineered microorganisms in environmental health-Genetically engineered plants and microorganisms in agriculture and productivity-Genetically engineered bacteria in bioremediation of organic pesticides, insecticides oil spills-Hazards of genetically engineered microorganisms, plants and animals-Policies of genetic engineering research.

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