

M.Sc., Environmental Sciences
Semester II (CORE COURSE- V)

M2 ENV01-CC05

CREDITS : 04

BIODIVERSITY CONSERVATION

Unit I

Concepts and component of biodiversity- genetic, species and ecosystem biodiversity, evolution of organisms & distribution in space and time, levels of biodiversity, biodiversity indices, value of biodiversity, biodiversity trends, modern techniques of measurement and monitoring of biodiversity, bio prospecting, patent protection and bio piracy .

Unit II

Major threats to biodiversity, IUCN threat categories, Red data book, threatened plants & animals of India; Endangered flora and fauna of India and Rajasthan, Mega diversity zones of India, Hot spot concept and hot spots of India, Biodiversity informatics, International efforts in biodiversity conservation

Unit III

Conservation of biodiversity- *In-situ*- Sanctuaries, biospheres Reserves, National Parks, Nature Reserves, Preservations plots; *Ex- situ* - Botanical gardens, Zoos, Aquaria, Home Garden & Herbarium, In vitro conservation: Germplasm & gene banks, tissue culture, pollen and spore bank, DNA bank; Wildlife reserves in India, Theory of reserve design, Restoration of biodiversity; Ecosystem people and traditional conservation mechanism; Importance of biodiversity in Ecotourism; endemic flora and fauna of tropics and India with special reference to Rajasthan

Unit IV

National and International programmes for biodiversity conservation; Conservation of wildlife-significance and status of India, Wildlife reserves- Biosphere and nature reserves, Project tiger, sanctuaries and national parks in India; Impact of tourism on wild life and problem in wildlife protection; Role of WWF,WCU,CITES, TRAFFIC .

Unit V

Conservation of forests; Indian strategies and planning; Agroforestry, Social forestry; Management of forest products; Forests and tribals; Chipko Aandolan; Coral reefs, mangroves and estuarine biodiversity and their conservation; wetland conservation with special reference to Rajasthan; Biodiversity and agenda-21; Biodiversity conventions.

M.Sc., Environmental Sciences
Semester II (CORE COURSE- VI)

M2 ENV02-CC06

CREDITS : 04

ENVIRONMENTAL CHEMISTRY

Unit-I

Concept and Scope of Environmental Chemistry; segments of environment; Principles and cyclic pathways in the environments; Chemistry of Biologically Important Molecules: Chemistry of Water: Unusual physical properties, hydrogen bonding in biological systems, unusual solvent properties, changes in water properties by addition of solute. Protein structure and biological functions, enzymes, enzyme metabolism

Unit - II

Basic chemistry: Structure of atoms, their properties, their nuclear stabilities and their arrangement in the periodic table; fundamentals of chemical thermodynamics and solution format ion-Normality, Molarity, Molality, Molecular weight, Equivalent weight, Mole concept; basic organic chemistry and biochemistry; Stoichiometry, Gibb's energy, Chemical potential, chemical equilibria, acid-base reactions; Solubility product, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons.

Unit - III

Classification of elements, chemical speciation, Particles, ions and radicals in the atmosphere; Chemical processes for formation of inorganic and organic particulate matter; Thermochemical and photochemical reactions in the atmosphere; Basic concepts of surface and interface chemistry: Absorption, adsorption, catalysis; collides, surfactants; carbonate system, radionuclides, radioactivity, decay of parent and growth of daughter nuclides & methods of radiometric dating; C14 dating system and procedure, stable isotopes - their fractionation and application to geo thermometry and paleo climates.

Unit - IV

First law of thermodynamics, enthalpy, adiabatic transformations; second law of thermodynamics, Carnets cycle, entropy, Gibb's free energy, chemical potential, phase equilibria, Gibb's Donnan equilibrium; third law of thermodynamics, enzymes catalysis, Michaelis/ Men ten equation; Concept, principle and utility of green chemistry, green reagents, green catalysts, industrial interest in green chemistry.

Unit - V

Oxygen and ozone chemistry, Chemistry of air pollutants, Photochemical Smog, Chemistry of water, concept of D.O., B.O.D., and C.O.D. Water treatment: Sedimentation, Coagulation, Filtration, tertiary and advanced treatment; Redox potential; Inorganic and organic components of soil; nitrogen pathways and NPK in soils. Bio transformation and bio magnification; Principles of photo chemistry- Photo chemical & photo sensitized reactions, energy transfer.

M.Sc., Environmental Sciences
Semester II (CORE COURSE- VII)

M2 ENV03-CC07

CREDITS : 04

ENVIRONMENTAL MANAGEMENT AND SUSTAINABILITY

Unit I

Introduction, concept and scope of environmental management; Systems and approaches, International summits and treaties-Vienna convention, Montreal protocol, Kyoto protocol, Copenhagen convention; International Organization of Standardization (ISO): concept, significance and scope.

Unit II

Sustainable development –concept & growth of idea, energy issues, Sustainable use of natural resources, Sustainability in industry and agriculture; relation of EIA with sustainable development; eco labelling , eco marketing, eco restoration, green funding

Unit III

Basic concept of ISO 9001- scope, structure, guidelines, implementation and certification process.

Unit IV

Basic concept of ISO 14000- scope, structure, guidelines, implementation and certification process; Environmental Audit, Environmental accounting; Environmental Management of Industrial pollution in relation to ISO 14000.

Unit V

Management system OHSAS 18001 (occupational health & safety), ISO 26000 (social responsibility) AND ISO 50001 (energy management) - scope, structure, guidelines, implementation and certification process.

M.Sc., Environmental Sciences
Semester II (CORE COURSE- VIII)

M2 ENV04-CC08

CREDITS : 04

ENVIRONMENTAL HAZARDS AND MANAGEMENT

Unit I

Introduction to hazards, classification and types: -Natural Hazards, Chemical hazards, Physical hazards, Biological hazards; Basics of hazard management and mitigation, natural Hazards -causes, continental drift, plate tectonics and sea floor's spreading; hazard analysis, potential risk; Human perturbation and natural hazards - impact of deforestation, land use and developmental activities on natural hazards, Role of climate change; Man Made hazards - Dams & reservoirs, NPP; Desertification-causes, evaluation, Mitigation.

Unit II

Natural Disasters: nature, causes and effect, Cyclone, tornadoes, floods, earthquakes, avalanches, Tsunami ,land slides, drought, fires, volcanism, Case study of disasters- community reaction to disasters, coping mechanism; disaster management-pre disaster phase, actual disaster phase, post disaster phase.

Unit III

Disaster assistance-technological assistance, relief camps, food requirement, water needs, sanitation security, information administration, fire fighting training, Safety Measures - a general account, emergency rescue, disaster education- alternatives and new direction, Forecasting and warning systems

Unit IV

Concept of disaster recovery- mitigation and preparedness, program planning and management, Vulnerability analysis, Training needs - Target Groups, emergency preparedness plan, occupational risk analysis survey and health evaluation, behavioral studies, Man-made disasters-occupational injury, Industrial Safety Management Techniques - Industrial Safety Standards, Industrial Accidents and Disasters - Frequency Rate, Prevention and Control; Dispersion of Radioactive material and release of Toxic and inflammable materials

Unit V

Environmental hazards, protective measure while handling hazardous substance, hazardous waste disposal. Hospital waste handling and disposal, guidelines for their disposal, fire and explosion hazards, radiation hazards. Case studies related to hazardous waste accidents, simplified measures for their assessment. Various diseases related to handling of hazardous waste. Nasal cancer and other fatal diseases- their symptoms, prevention and control.

M. Sc. Environmental Sciences

Semester II

(PRACTICAL COURSE - CPR-III)

M2 ENV05-CP03

CREDITS-04

1. Find out the percentage frequency values of grassland species using 1 x 1 size quadrat. Classify the species into frequency classes A to E and prepare the frequency diagram. Compare result with Raunkiers standard frequency diagram.
2. Determine the biomass of producers.
3. Find out the effect of various quadrat size 25 x 25, 50 x 50, 75 x 75 and 1 x 1 m on percentage frequency result on same grassland plot considered in exercise I
4. Find out the species diversity index in disturbed and protected vegetation area.
5. Find out the leaf area index of crop field.
6. Study of anatomical features of ecological adaptation in selected hydrophytes and xerophytes.
7. Study of climatic conditions obtained in open field and under the shade of trees for temperature, light intensity, wind velocity, R.H and comparison of ground vegetation of these areas.
8. To determine the age of forest patch by DBH.
9. To determine the vegetation by Point frame quadrat method.

> **Spotting:**

- **Xerophytes:** Nerium - Stem & leaf; calotropis stem; capparid stem; pinus needle; opuntia; euphorbia, casuarina
- **Hydrophytes:** Ecchorhia, Hydrilla, trapa, nymphaea, chara, potamogeton, scirpus, nelumbo
- Pointframe
- **Xerophytic animals:** Phrynosoma, draco
- **Aquatic animals:** exocoetel, hyla, guppy, katla, Rohu, gambusia

M. Sc. Environmental Sciences
Semester II
(PRACTICAL COURSE - CPR-IV)

M2 ENV06-CP04

CREDITS-04

1. Analysis of Soil samples

- (1) Texture
- (2) Moisture
- (3) pH
- (4) conductivity
- (5) Water holding capacity
- (6) Bulk density & porosity
- (7) Calcium carbonate
- (8) Sulphate
- (9) Carbonate and bicarbonate
- (10) Organic carbon & organic matter
- (11) Chlorides
- (12) Nitrates (13) Available phosphorus

2. To compare the wilting coefficient of a xerophytic and mesophytic plant.

3. Assessment of noise pollution in different zones of the city by Sound level meter.

4. Study of soil for biotic components like bacteria, fungi & soil nematodes.

> **Spotting:**

- Instruments-Spectrophotometer, sound level meter, colorimeter, refrigerated centrifuge
- Foot prints- of wild animals as available for demarcation of territory.
- Soil fauna-Micro & macro fauna: Millipede, centipede, earthworm, nematodes, actinomycetes
- Soil fungi and soil bacteria
- Sieves set for soil texture