

**PET SYLLABUS
ENVIRONMENTAL SCIENCE
SECTION - B**

Unit – I Ecology and Environmental Biology

Atmosphere: Definition, Composition of air; Physico-chemical structure of atmosphere: Troposphere, Stratosphere, Mesosphere, Ionosphere, Exosphere. **Lithosphere:** Definition; Types of rocks; Process of soil formation: Physical weathering, Chemical weathering; Physical properties of soil : Density, Porosity, Permeability, Temperature, Soil water, Soil atmosphere; Chemical properties of soil : Hydrogen ion Concentration, Organic matter, Inorganic elements; Soil erosion: Agents of soil erosion: Running water, Glaciers, Wind, Sea water, Deforestation and Overgrazing; Types of erosion: Sheet erosion, Rill erosion, Gully erosion, Slip erosion (land slide), Wind erosion; Soil conservation. **Hydrosphere:** Definition, Physical properties of water : Temperature, Specific gravity, Viscosity, Thermal conductivity, Expansion before freezing, Surface tension, Solvency, Buoyancy, Transparency, Pressure; Chemical properties of water : Salinity, Solubility of gases, Oxygen, Carbon dioxide, Nitrogen, Hydrogen ion concentration, Hydrogen Sulphide.

Basic concepts in an Ecosystem : Definition; Components of ecosystem; Abiotic components: Light, Temperature, Pressure, Water, Wind, Soil; Biotic components: Species diversity, Species dominance; Intraspecific interactions; Interspecific interactions: Neutralism, Commensalisms, Mutualism, Parasitism, Predation. Energy flow in an ecosystem: Primary production, Secondary production; Food chain: Grazing food chain, Detritus food chain; Food web; Ecological indicators, Wild life conservation.

Unit II : Water : Sources & Uses

Natural Water Resources types: Rainfall and runoff: Hydrology precipitation, rain and snowfall water, measurement of rainfall, determination of average precipitation analysis of rainfall records rainfall intensity duration –frequency Relationship, artificial rainfall Runoff evaporation losses unit hydrograph. Surface sources: Streams lakes Rivers, Ponds, impounded Reservoirs, Stored rainwater, Suitability of Surface water with regard to quantity and Quality.

Under ground water Resources: Infiltration, porosity, water bearing stratum, Ground water flow, ground water yield, permeability. Ground water quality, Natural contaminants, Contamination from domestic wastewaters, Industrial and commercial sources, Agricultural sources, Aquifers, Infiltration galleries, Infiltration wells, Shallow wells, Deep wells, Tube wells, Artesian wells; Springs: Artesian, Gravity, Surface.

Domestic Uses, Civic or Public purpose, Industrial purpose, Business or Trade Purpose, Agriculture Purpose, Navigation, Hydroelectric Power Generation Purpose, Recreation Purpose, Factors affecting Water use Loss and waste.

Unit III : Pollution Studies :

Air Pollution : Sources (Stationary and Mobile Sources), Effects : Effects of air pollution on human health, Vegetation, Animals; Long term effects on the planet : Green house effects, Ozone layer depletion, Acid rain, Global warming Photochemical smog; Control measures of air pollution; Air quality standards,

Water Pollution : Quality of sewage : Physical properties, Chemical properties, Biological characteristics; Sources of water pollution: Domestic, Industrial and Biological.

Noise Pollution : Sources of Noise, Effects of Noise Pollution : Auditory effects & Non auditory effects, Noise pollution Control.

Soil Pollution : Sources of soil pollution: Industrial wastes, Urban wastes, Radioactive wastes, Agricultural practices, Chemical and metallic pollutants, Biological agents; Absorption of toxic metals by soil; Chemicals absorbed in the soil, Cadmium accumulation in soil, Animal manures added to soil, Waste water added to soil, Solid waste applied to soil, Salt stress in soil; Detrimental effects of soil pollution : Effects of Industrial pollutants, Effects of urban waste products, Effects of radioactive pollutants, Effects of modern agro technology, Effects of pesticides.

Unit IV : Environmental Chemistry :

Structure and composition of atmosphere. Chemical composition of air. Classification of elements. Chemical speciation. Particles, ions and radicals in atmosphere. Chemical processes for formation of inorganic and organic particulate matter. Photochemical reactions in the atmosphere. Oxygen and ozone chemistry of air pollutants. Photochemical smog.

Concept of DO, BOD and COD, Sedimentation, coagulation, filtration, redox potential. Hydrosphere characteristics And structure. Properties of water bodies: Alkalinity, acidity, calcium and other metals in organic pollutants, soaps, oil, detergents and pesticides in water.

Analytical procedures, Sample collection guidelines, Sample preservation, Sampling order, Sample labeling, Data collection and record keeping,

Unit V : Waste water Engineering :

Screens, Grit chambers, Skimming Tank, Sedimentation, Primary clarifiers, Secondary clarifiers, Coagulation of sewage, Activated sludge process, Trickling Filters, Oxidation ponds, Septic tanks, Sludge digestion tank, Bio gas, Chlorination, Garbage collection and disposal.

PET SYLLABUS ENVIRONMENTAL SCIENCE

Unit – I :

Ecological status in India, Scope, Applied ecology, Concepts of ecology, ecological importance, Ecology and Environment, Ecological energetics. Population ecology, Natality, Mortality, Fecundity, Density, Age distribution, Biotic potential, Prey predator relationship, Factors influencing dispersion and migration.

Ecosystem and Productivity, Energy flow in an ecosystem, Freshwater ecosystem, Pond ecosystem, Lake ecosystem, River ecosystem, Marine ecosystem; Estuarine ecosystem, Terrestrial ecosystem, Primary productivity.

Unit – II :

Biodiversity, Importance of biodiversity, Major hotspots of biodiversity in India. Reasons of depletion of biodiversity, Gene pool, Germ plasm bank, Species conservation, Biodiversity legislation, National environmental policy.

Toxicology and scope, Dose response relationship, Chemical carcinogenesis. Pesticides, Herbicides, Fungicides, Carcinogens, Industrial pollutant, Environmental Impact Assessment, Cost Benefit Analysis, EIA in India, Eco –Labeling.

Unit III :

Removal of oil and grease, Sludge settling, recycling and disposal, Aerated lagoons, Nutrient requirement, Nutrient content of Algae, Algal growth and oxygen production, Role of aquatic macrophytes in waste water treatment.

Up flow anaerobic sludge blanket process: Gas recovery, Nutrients, toxicity, plant operation, Post treatment requirements. Sewage as fertilizer.

Unit – IV :

Pesticide toxicity, Degradable and non-biodegradables Pesticides. Pesticides and human health, Exposure to ionizing radiations, Reproduction. Accumulation of toxicants in organisms, Toxic residues, Factors affecting toxicity, Evaluation of toxicity, Bioassays.

Absorption and distribution of toxicants, Bio-magnification, Biotransformation, Environmental hazards and environmental risk assessments.

Unit V :

Indicators and pH colour values, Chemicals used in water and spent water, Use of chemicals in potable water treatment.

Industrial activity and environment, Air pollution, Air pollutants, Nitrogen oxides, Photochemical oxidants, Smog formation, Chemistry of acid rain, Formation of acid rain, Effects of acid rain, Efforts to control acid rain, International legislation, International agreements.

Unit – VI :

Global warming, Green house effect, Acid rain, Ozone layer depletion. Gaseous air pollutants, Radio active gases, Volcano, Accidental fires in forests, Automobiles. Principles of absorption and adsorption, Global Climate change, Meteorological factors influencing air pollution.

Unit VII :

Biomass, Biogas generation and its significance in waste recycling, Bio-ethanol, Bio-diesel, Bio-fertilizer- bacteria and fungi, Natural composting, Vermicomposting technology. Earthworm technology, Biosensors and environmental pollutants, Bioreactors and its scope, Biological process, Periodic biological Sequencing batch reactor (SBR), Membrane bioreactor. Environmental and biotechnological management, Bioremediation, Bio-remedial applications.

Unit VIII :

Temperature measurement, Turbidity measurement, Rain gauges, High performance liquid chromatography, Spectrophotometer, Atomic Absorption Spectrophotometer, Flame Photometer, Fluoride meter

Unit IX :

Natural resources, Renewable and Nonrenewable resources, Basic human requirements, Limitations of non renewable and renewable resources,

Uses of forest resources, Non wood products, Forest and employment, Forest and Environment, Deforestation and Degradation, A forestation, Social forestry, Agro forestry, Industrial forestry, Grass land and environment.

Unit X :

Remote sensing systems, Indian Remote sensing programs, Radar, Global Positioning Systems, Indian remote sensing satellites, GIS, Biostatistics, Application of Biostatistics in Environmental study.

Natural Disasters, Floods, landslides, earthquake, volcanism, avalanche, cyclones, drought and fire, Tsunami, Wind storms.
