

First Semester (General) Syllabus:

Paper - 1

Unit - I (ES01): Introduction to Earth and Environment

Origin of universe; evolution of earth, atmosphere, hydrosphere, Lithosphere, Pedogenesis and origin of life; Structure and components of earth, plate tectonics and continental drifts; Orogenesis; Upwelling (Oceanic zones, ocean currents), Environmental determinism.

Unit -II (ES02): Ecology and Ecosystem dynamics

Concept of Aut-ecology and Syn- ecology; Population Ecology, Community ecology; Law of minimum and limit of tolerance, Ecological niche and habitat concept, Ecological succession, Ecosystem Structure: Physico-chemical and Biological components of ecosystem; function of ecosystem: biogeochemical cycle and energy flow in ecosystem, different types of ecosystems (aquatic, forest, grassland, desert, Wetlands and Estuaries), Ecosystem Dynamics : Primary and Secondary succession, Climax community; Species interaction, Major Biomes of the World.

Unit - III (ES03): Natural Resource and their Management

Resource and reserves (Minerals, fossil fuel); Renewable and non renewable energy resources: Solar, Wind, Hydel, Geothermal, OTEC, Tidal energy, Nuclear energy, gas hydrates; Energy plantation and biofuel, Agro-ecosystem management, conservation and management of soil and water body: surface and subsurface water.

Unit -IV (ES04): Environmental Education and Major Environmental Issues and Movements

Objectives of EE, guided principles, Strategies for EE. Models for future EE systems. Climate change: adaptation, mitigation and vulnerability; Man induced Seismicity, Avalanches, Forest fire, La-Nina, El- Nino and Indian Agriculture, Big dam movement, Chipko movement, Silent valley movement; Montreal Protocol, Kyoto protocol, Carbon Trading.

Second Semester (General) Syllabus:

Paper - 2A

Unit - I (ES05) Analytical Techniques and Environmental Statistics

Principles and Applications: Titrimetry, Spectrophotometry, Flame Photometry, Electrophoresis, Atomic Absorption Spectrophotometry, Gas Chromatography, Microscopy: SEM, TEM and Image analysis; Sampling, Measures of Central tendency (mean, median, mode), SD, SE, Probability, Types of error, test of significance (Student t- test, F-test, Least Significant Difference); Correlation, regression.

Unit -II (ES06): Biodiversity Conservation

Concept of Biodiversity, hierarchical levels (genetic diversity, species diversity, ecosystem diversity); Gradients of biodiversity (Latitudinal change); Biodiversity as a resource; Causes of biodiversity loss, , Rare, Threatened and Endangered flora and fauna, Concept of Endemism and Invasive species, Global Biodiversity Hotspots, Strategies for Biodiversity

Conservation Ex-situ, In-situ (Wild life sanctuaries, National Parks and Biosphere reserves, Gene and Seed bank), Biodiversity documentation, Convention on Biological Diversity.

Paper – 2B (Practical)

1. Identification of rocks
2. Climatic maps – drawing of Hythergraph and Climograph
3. Identification of important minerals.
4. Study of meteorological parameters: light intensity, ambient temperature, wind velocity and relative humidity.
5. Estimation of moisture, temperature and conductivity of soil
6. Determination of transparency, temperature and conductivity of water
7. Determination of requisite size and number of quadrates to be laid down for studying vegetation.
8. Determination of Density, Abundance and Frequency of component species in a Grassland Community.
9. Measurement of primary productivity of a pond ecosystem
10. Estimation of population size from population chart by quadrate method
11. Computation of Mean, Median, Mode and Variance of the given environmental data set.
12. Working on Word Processing software
13. Preparation of Power point presentation for seminar

Third Semester (General) Syllabus:

Paper – 3A

Unit – I (ES07): Environmental Chemistry

Laws of thermodynamics, Chemical composition of Earth, Chemical composition of Air and Soil; Metals, Hydrocarbons. Biogeochemical cycles: Nitrogen, Phosphorus, Carbon, Sulphur; some important chemical processes (pyrolysis, fermentation, degradation pathways of organ chemicals), Chemical nature of pesticides, surfactants, heavy metals, Photo Chemical Smog, Ozone Chemistry, Acid Rain, BOD and COD.

Unit –II (ES08): Environmental Pollution and degradation

Definition, Type, source and consequence and remedial measures of Pollution (Air, Water, Soil, Noise, Radiation and Thermal); Sources and remedial measures for Marine and Coastal Pollution; Causes and consequences of Environmental degradation: deforestation, desertification and soil erosion.

Paper- 3B (Practical)

1. Determination of SPM in atmosphere (roadside and classroom).
2. Determination of total suspended solids (TSS) and total dissolved solids (TDS) in water sample.
3. Determination of alkalinity, chloride, calcium and magnesium content of water samples.
4. Study of the soil profile.
5. Estimation of soil organic carbon content in grassland and forest.
6. Determination of pH of grassland and forest soil.

7. Comparative study of different types of lichen population (crustose, fructose and foliose) in disturbed and undisturbed forest ecosystem.
8. Monitoring of noise level in public area (campus and roadside).
9. Inventorization of important local NTFPs.
10. Study of Mycorrhizal association.

Fourth Semester (General) Syllabus:

Paper – 4A

Unit –I (ES09): Ecotoxicology and Environmental health

Pesticides – types and mode of action; Bio-entry, Bioaccumulation, Bio-transformation and Biomagnifications ; Persistent Organic Pollutants (Organochlorine), Concept of LD50 and LC 50, Concept of xenobiotics, indices of toxicology, mutagens, carcinogens and teratogens and mutagens – their effects on human system, Concept of environmental health, water borne, Air borne and Vector born diseases, Causes and remedial measures of Malaria, Arsenikosis, and Amoebiosis. Toxins of biological origin; Occupational health. Epidemiological Issues - Goiter, Fluorosis.

Unit – II (ES10) Remote sensing and GIS

Definition, principle and kind of remote sensing, types of images and data, aerial photographs, resolution, pixel, electromagnetic spectrum, Global positioning system, data interpretation, mapping, False colour composing, Normalized Differential Vegetation Index, Reflectance pattern of different surfaces, application of remote sensing and GIS in environmental management.

Paper – 4B (Practical)

1. Determination of *Coliform* count in natural waters.
2. Study of root nodules of a nitrogen fixing plant.
3. Estimation of nitrate and phosphate content in natural waters.
4. Demonstration on the use of GPS.
5. Preparation of area map by using GPS.
6. Demonstration on the use of ARC-GIS software.
7. Determination of Height and Distance of an object from ground with Clinometer.
8. Visit to a place/ area/ locality promoting biodiversity conservation and preparation of field report using GIS.
9. Demonstration and editing of Scientific photography and videography
10. Visit to a health institution and preparation of health report.

Fifth Semester (General) Syllabus:

Paper – 5A

Unit –I (ES11): Disaster management and Traditional knowledge system

Nature and types of Disaster, Earthquake, Tsunami; Disaster management plans, Roles and regulatory functions of NIDM and NDMA in disaster management. Intellectual Property

Rights, Traditional Agroforestry system, Traditional Water Harvesting system and Traditional health care system; Ethno-biology Wild Edibles.

Unit - II (ES12): Environmental Biotechnology and Management

Management of Municipal Solid Waste, Biomedical waste, Hazardous waste and Electronic waste, Integrated pest management; Biopesticides, Bio-fertilizer, Vermicomposting and its importance. Environmental monitoring; environmental audit and reporting; major environmental acts: Air, Water, Wildlife and Biodiversity; Concept of Sustainable Development; Joint Forest Management; Environmental Impact Assessment (EIA); Environmental management Plan.

5B (Practical)

1. Preparation of Pre disaster, disaster and post disaster plans for earth quake disaster.
2. Measurement of girth, height and volume of tree bole.
3. Determination of similarity and dissimilarity by Morisita Index and Bray Curtis methods.
4. Determination of Simpson Diversity Index (λ) in a forest community.
5. Study of important ethno-medicinal plants with the help of herbarium.
6. Determination of texture of given soil sample.
7. Identification of plants of a grassland and forest community.
8. Preparation of vermicompost.
9. Preparation of environmental models on Global warming, Climate change, Water harvesting Technique etc.

Six Semester (General) Syllabus

Project in Environmental science.