

B.Sc. Environmental Science Syllabus

B.Sc. Part - I

PAPER – I

Elements of Ecology and Environmental Biology

Unit- I

Definition, Scope and basic principles of ecology and environment. Biological levels of organization, population, community, ecosystem and biosphere. Characteristics of terrestrial fresh water and marine ecosystems.

Unit- II

Ecosystem: Basic concepts, components of ecosystem, forests, grasslands, lake, river and marine ecosystems of India. Trophic levels, food chains and food webs. Ecological pyramids, ecosystem functions. Energy flow in ecological systems, energy efficiencies. Major biomes of the world. Soil formation, soil profiles. Physical and chemical characters of soil. Soil biological characters. Topographic factors.

Unit- III

Population: Basic concepts, population characteristics – density, natality, mortality, age-structure, population growth. Ecological niche and habitat. Positive and negative interactions of populations – competition, predation, parasitism, mutualism.

Unit- IV

Community: Basic concepts, community structure, growth forms, life form. Analytical and synthetic characters of plant community. Methods of plant community analysis. Concept of keystone species and ecotone. Succession: Concepts of succession, Types of Succession.

PAPER – II

Biodiversity Conservation and Wild Life Management

Unit- I

Biodiversity: Basic concepts, importance and conservation needs, levels, uses, types of biodiversity, some biodiversity indicators. Economic importance of wild life.

Unit- II

Factors for decline of biological diversity. Approaches for conservation of biological diversity. Protection of wild flora, fauna and natural habitats. Concept of threatened species. Threatened and endangered animals and plants of India.

Unit- III

Food, timber and medicinal plants non-timber forest produce. Importance of tropical rain forests and wetlands. In-situ conservation, Ex-situ conservation. Wild life sanctuaries, National Parks and Biosphere Reserve. Gene and germ-plasm banks.

Unit- IV

Biodiversity conventions. International and national efforts to conserve biodiversity. Socio-cultural aspects of biodiversity. Biotechnological needs for biodiversity conservation. Traditional knowledge and biodiversity conservation.

PAPER – III Energy and Environment

Unit -I

Energy Utilization: Basic concepts and role in human civilization, Energy scenario in India Renewable and non renewable sources of energy, Sustainable use of energy resources.

Unit – II

Non Renewable Energy Resources: Fossil fuels and their reserves, Nuclear energy, types, uses and effects, Energy utilization and its effects on environment, Energy crisis.

Unit -III

Renewable Energy Resources: Hydropower, Solar energy, geothermal, tidal and wind energy, Biomass energy, OTEC, biogas and its advantages.

Unit -IV

Energy conservation: In agriculture and industrial sector. Energy plantation; Petro crops, Hydrogen as a source of energy, Energy from waste.

Paper I	-	Elements of Ecology and Environmental Biology	34 Marks
Paper II	-	Biodiversity Conservation and Wild Life Management	33 Marks
Paper III	-	Energy and Environment	33 Marks

Total	100 Marks
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Practical: The practical examination will be based on the course work prescribed for Paper I, II and III.

Practical Examination	35 Marks
Viva-Voice	05 Marks
One test during the year	05 Marks
Class record	05 Marks

Total	50 Marks
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B.Sc. Part - II

PAPER – I

Natural Resources Management

Unit -I

Biological resources: Types and uses of biological resources, Forest Management, Forest resources of India, Wild life conservation efforts in India, Project tiger, Project elephant and Rhino, range management. Social forestry and Agro-forestry.

Unit -II

Water resources: Types and uses of water resources, Methods of enhancing fresh water supply Watershed management & its importance, Sustainable use of water resources.

Unit -III

Soil; types of soil, soil erosion, soil conservation techniques, Types of land use, Land conservation strategies.

Biogeochemical Cycles: Importance, Carbon, Nitrogen, Phosphorus and Sulphur Cycles, Global Oxygen Cycles, Hydrological cycles.

Unit -IV

Environment education and ethics. Major conservation efforts – WWF, IUCN, UNEP, CITES, ENVIS. Role of NGO's in Environment protection, Role of remote sensing in resource management.

PAPER – II

Physico-Chemical Environment and Natural Hazards

Unit -I

Earth Atmosphere: Origin and Composition, Distribution of temperature and pressure in atmosphere. Radiation budget of earth's atmosphere, Thermal Inversion.

Unit -II

Brief idea about composition and origin of earth, Internal structure of earth, landforms, Rocks types; igneous, Metamorphic and sedimentary rocks. Earthquakes, Avalanches, Volcano.

Unit – III

Aquatic environment: Fresh water, Eco System, Coastal eco systems, a general account of mangroves and coral reefs. Ground water aquifers, Causes for depletion, Water conservation strategies, rain water harvesting. Floods and its management. Tsunami, Hurricanes.

Unit - IV

Climate classification; monsoons, Influences of meteorological factors on air quality, Types of ionizing radiations, Effect of UV radiations on physical and biological systems.

PAPER – III

Environmental Pollution and Management

Unit - I

Principal of Environment Management, Air pollution: sources of air pollution, Primary and secondary air pollutants. Origin and effects of SOX, NOX, CoX, CFC, Hydrocarbon, Photochemical smog, heavy metals, particulates. Effects of air pollution on plants and air quality, Human health and animals, Economic losses.

Control of Pollution: Control of stationary sources of pollution, Particulate emission control, gaseous emission control, Role of plants and trees in pollution abatement, green belt development for industries.

Unit - II

Water pollution: sources and types of water pollution, Effects of water pollution, Eutrophication, A brief idea of marine and ground water pollution

Soil pollution: Causes of soil pollution, Effects of soil pollution, Pesticides in soil environment and their effects, Biological magnification, pollution through mining.

Unit - III

Waste Generation: Biodegradable and non biodegradable wastes, Agricultural, domestic, industrial, and E-wastes, Plastic waste and disposal, Hazardous waste – origin and types.

Waste Management: Methods of waste disposal, incineration, landfill, Composting, Anaerobic waste degradation, Production of liquid and gaseous fuels from waste, Hazardous waste management.

Unit - IV

Climate change: Causes and effects, Threats to stratospheric ozone, Green house effect, acid rain, climate convention. Sources and effects of noise pollution, noise standards.

Paper I	-	Natural Resources Management	34 Marks
Paper II	-	Physico-Chemical Environment and Natural Hazards	33 Marks
Paper III	-	Environmental Pollution and Management	33 Marks
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Total			100 Marks
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Practical: The practical examination will be based on the course work prescribed for Paper I, II and III.

Practical Examination	35 Marks
Viva-Voice	05 Marks
One test during the year	05 Marks
Class record	05 Marks
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Total	50 Marks
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B.Sc. Part - III

PAPER – I

Environmental Monitoring

Unit - I

Environment monitoring: Concept, aims, measurement and data collection on, Meteorological parameters – solar radiation, temperature, Humidity, precipitation, wind direction and speed. Plume behavior, wind rose – a brief idea.

Unit - II

Chemical aspect of air quality monitoring: sampling of gaseous and suspended, particulate matter; basic considerations, devices and methods used : absorption, adsorption, condensation, sedimentation, filtration, Impingement, electrostatic precipitation, centrifugal methods.

Unit – III

Water quality monitoring: water quality parameters, Physical and chemicals characteristics of water: Colour, turbidity, odour and taste, total solids, conductivity, pH, acidity, alkalinity, hardness, Dissolved Oxygen, Biological Oxygen Demand, Chemical Oxygen demand

Unit - IV

Biological aspects of Environment Monitoring: Bio indicators, Environmental Monitoring, Microbiological quality of water, Bio indicators of water quality, Vegetation monitoring – a brief idea.

PAPER – II

Environmental Techniques & Impact

Unit - I

Basic environmental techniques: Colorimetry, Flame photometry, Chromatography – paper chromatography, Thin layer chromatography, Column chromatography, Gas chromatography, Gas Liquid chromatography, AAS.

Unit - II

Sampling methods: Random and non random sampling – concepts of mean (Arithmetic mean, Geometric mean, Harmonic mean), mode, median, Standard deviation and Standard error, t-test and Chi. Square test

Unit -III

Computer application in environmental monitoring, Measurement of soil salinity and acidification.

Unit - IV

EIA – Aims, objectives and methods, EIA case studies river valley, projects and thermal power plants, Geographical Information System, Remote sensing and application in environment.

PAPER – III
Eco Restoration and Sustainable Development

Unit - I

Degraded lands: agricultural practices and land degradation, Mining and its impact on soil quality
Conservation of degraded lands, Rehabilitation of mine soils and salt affected soils,

Unit - II

Soil Conservation: Biological reclamation techniques, Bio fertilizers, mycorrhiza, Vermi composting,
afforestation, reforestation, Organic farming, Bio remediation.

Unit - III

Approaches for environmental awareness and education, Role of media and NGO in environmental
awareness, Role of women in environmental awareness. Eco development and environmental friendly
products and technologies.

Unit - IV

National environmental policy, Environmental laws in India, Sustainability – concept, principles and
practices, Sustainable management of resources, Ecological modeling – a brief idea. Basic concept of
sustainable development and its goals, sustainable urban and rural development.

Paper I	-	Environmental Monitoring	50 Marks
Paper II	-	Environmental Techniques & Impact	50 Marks
Paper III	-	Eco Restoration and Sustainable Development	50 Marks
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Total			150 Marks
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Practical: The practical examination will be based on the course work prescribed for Paper I, II and III.

Practical Examination	50 Marks
Viva-Voice	10 Marks
One test during the year	05 Marks
Class record	10 Marks
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Total	75 Marks
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