Content Product
Detailed syllabus
ENVIRONMENTAL SCIENCE AND ENGINEERING

UNIT I - ENVIRONMENT, ECO SYSTEM AND BIODIVERSITY

Introduction to environment - Introduction to environment, Environmental studies, Types of environment, Scope and importance of environmental studies, **Hazards** - Chemical hazards, Physical hazards, Biological hazards, Bacterial hazards, Viral hazards, Parasitic hazards (Worms and Protozoa), **Ecosystem** - Ecosystem, Producer, consumer and decomposer, **Oxygen cycle and Nitrogen cycle** - Oxygen cycle, Nitrogen cycle, **Energy flow in the ecosystem** - Energy flow in the ecosystem, **Food chains, Food webs and Ecological pyramids** - Food chain and food web, Ecological pyramids, **Ecological succession processes** - Types of succession, General principles of succession, **Forest and Grassland ecosystem** - Types of forest ecosystem, Structure and function of forest ecosystem, Types of grassland ecosystem, Structure and function of grassland ecosystem, **Desert and Aquatic ecosystem** - Types of desert ecosystem, Structure and functions of desert ecosystem, Types of aquatic ecosystem, Marine (Ocean) ecosystem, Estuarine ecosystem**, Biodiversity** - Biodiversity, Value of biodiversity, **Hot spots of biodiversity** - Hot spots of biodiversity, **Threats to biodiversity** - Threats to biodiversity, Endangered and endemic species, Endemic species, Conservation of biodiversity.

UNIT II - ENVIRONMENTAL POLLUTION

Environmental pollution - Environmental pollution, Introduction to air pollution, Air pollution, Sources of air pollution, **Classification of air pollutants** - Classification of air pollutants, Smog, Photochemical smog, **Causes and effect of air pollution** - Causes of air pollution, Effect of air pollution, **General effects of air pollution** - General effects of air pollution, Ozone layer depletion, Acid rain, **Control of particles and gaseous emission** - Control of particles and gaseous emission, Air pollution controls by vegetation, Air pollution controls by stacks, Air pollution controlling devices, Gravity settling chamber, Cyclone separators, Fabric filters, Wet collection devices, Cyclonic scrubbers, Venturi scrubbers, **Sources and control of some air pollutants** - Sources and control of some air pollutants, Control of NOx pollution, Sources of oxides of carbon, Control of CO pollution, Sources of sulfur oxides, Control of SOx pollution, Sources and control of hydrocarbons, **Water pollution** - Introduction to water pollution, Sources of water pollution, Classification of water pollutants, Physical and chemical characteristics of the marine water, Physical and chemical characteristics of the terrestrial water, Waste water characterization, Absorption of heavy metals – water treatment process, **Soil and marine pollution** - Soil pollution, Sources or causes of soil pollution, Effects of soil pollution, Control of soil pollution, Marine pollution, Sources of marine pollution, Effect of marine pollution, Control measures of marine pollution, **Noise and thermal pollution** - Noise pollution, Source of noise pollution, Effects of noise pollution, Prevention and control of noise pollution, Thermal pollution, Sources of thermal pollution, Effects of thermal pollution, Control of thermal pollution, **Nuclear hazards and solid waste management** - Nuclear hazards, Sources of nuclear hazards, Effects of radiations on man, Protection and control from radiation, Solid waste management, Classification of solid waste based on properties, Sources of solid wastes, Effects of solid wastes, Management of solid waste, Process of solid waste management, Pyrolysis and composting, Roll of an individual in prevention of pollution, Case studies - Related to pollution.

UNIT III - NATURAL RESOURCES

Forest resources - Forest resources, Uses of forests, Over exploitation of forest resources, Deforestation, Effects of deforestation, Forest management, **Case studies - Forest resources** - Timber extraction and mining, Dams and their effects on forests and tribal people, Case studies, **Water resources** - Water resources, Uses of water, Conflicts over water, Dams – Benefits and problems, Over utilization of surface and ground water, **Mineral resources** - Mineral resources, Classification of mineral resources, **Environmental effects of extracting and using mineral resources** - Environmental effects of extracting and using mineral resources, Impacts of mining, Case studies - Mineral resources, **Food resources** - Introduction to food resources, World food problems, **Environmental impacts of modern agriculture** - Environmental impacts of modern agriculture, Changes caused by agriculture and overgrazing, **Energy resources** - Energy resources, Growing energy needs, Non-renewable sources, Renewable sources, Solar energy, Nuclear energy, Hydel energy, Wind energy, Tidal energy, Geothermal energy, Case studies – Energy sources, **Land resources** - Land resources, Soil erosion and desertification, Role of an individual in the conservation of natural resources, **Environmental Biochemistry** - Introduction to environmental biochemistry, Proteins, Protein structure.

UNIT IV - SOCIAL ISSUES AND THE ENVIRONMENT

Sustainable and unsustainable development - From unsustainable to sustainable development, Urban problems related to energy, **Water conservation** - Water conservation, Water conservation methods, Rain water harvesting, **Watershed management** - Watershed management, Components of watershed management, Resettlement, Rehabilitation, Case studies - Dams and their problems, **Environmental ethics – Issues and possible solutions** - Environmental ethics, Urban and rural equity problem, Nuclear accidents and holocaust, Waste land reclamation, Consumerism and waste products, **Green chemistry** - Introduction to green chemistry, Green chemistry and environment, Concepts of green chemistry, Prevention and atom economy, Use of less hazardous chemicals and safer designing of products, Innocuous solvents and auxiliaries, Design for energy efficiency and use of renewable feed stocks, Reduce derivatives and catalysis, Design of degradation and real, Inherently safer chemistry for accident prevention, Applications of green chemistry, Limitations of green chemistry, **Environmental legislation and law** - The environment (protection) act, 1986, Power of central government to take measures to protect and improve environment, Appointment of officers and their powers and functions, Salient features of environmental protection act, Air pollution laws, Standards, Air pollution act 1981, Water pollution laws, Water (prevention and control of pollution) act, 1974, Functions of state pollution control board, Wildlife (Protection) Act, 1972, Forest (Conservation) Act, 1980, **Issues involved in enforcement of environmental legislation** - Biomedical waste, Issues involved in enforcement of environmental legislation, Disaster management, Earthquake, Cyclone, Landslides, Public awareness.

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UNIT V - HUMAN POPULATION AND THE ENVIRONMENT

Human population and the environment - Human population and the environment, Population, Population growth, Impacts of population growth (or) Consequences of population growth, Variation of population among nations, Causes and effect of population explosion, **Family welfare and planning programme** - Family welfare programme, Family planning programme, **Environment and human health** - Environment and human health, Human rights and environment, Human rights, Indian constitution, **Value education and HIV** - Value education, Significance (or) importance of value education, Types of values, HIV (Human immunodeficiency virus, Mode of HIV transmission, Symptoms for HIV/AIDS, Control of AIDS, **Women and child welfare** - Women and child welfare, Women's rights and privileges, Child welfare and development, **Environmental impact assessment** - Environmental impact assessment, Geological Information System (GIS), Application of GIS, Remote sensing in environmental engineering practice, Principles of remote sensing, Passive/active remote sensing, Advantages and disadvantages of remote sensing, Role of information technology in environment and human health, Case studies role of it in environment and human health.