ENVIRONMENTAL SCIENCE

Common to ECE, CSE, IT, CSE(AI&ML) & CSE(DS) Branches

21ES105MC/21ES205MC

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Course Objectives:

1. Understanding the importance of ecological balance for sustainable development.
2. Understanding the impacts of developmental activities and mitigation measures.
3. Understanding the environmental policies and regulations

Course Outcomes:

CO 1: Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable energy sources (Solar energy, Wind energy, Hydrogenpower energy, Tidal energy, Ocean thermal energy, Geothermal energy and Biomass energy) and non-renewableenergy sources (Coal, Petroleum, LPG, CNG and Nuclear energy), use of alternate energy source, case studies.

Activity:

1. Planting tree saplings – Forest resources; knowing the water sources of your local – visit to waterpurifying plant – documentation of the rivers of your state.
2. Food resources - Observe your personal diet for a week (Sunday - Saturday). Just record whatever you eat/drink and the amount. Prepare a chart stating its composition, energy levels itcan produce to your body (Calorific value) along with the photographic prints.

UNIT-II

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

Activity:

1. Visit to local national park, sanctuary or zoo – Photographic shooting of wildlife (flora and fauna).
2. Documentation on water resources and drought Ecosystems.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

Activity:

1. Biodiversity register – Prepare a list of the flora and fauna observed in the campus

➢ Common plants
➢ Common animals
➢ Common birds
➢ Common insects
➢ Common reptiles

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatmentmethods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **GlobalEnvironmental Issues and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation anddesertification. International conventions / Protocols: Earth summit, Kyoto protocol, andMontréal Protocol. NAPCC-GoI Initiatives.

Activity:

1. Solid Waste Management activity

➢ Collection of recyclable wastes – old newspapers and books etc, Getting books andstationery – distribute to the needy
➢ Establishment of Vermi Compost pit and reaping the compost

2. Visit to water treatment plants.

3. Eco-friendly models – Clay moulded idols with seeds in it – Upon dissolution, sprouting of seeds are seen. ‘Ganesh Chaturthi’.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act-1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

Activity:

1. Document the Wildlife Protection Policies and Legislation.
2. Case study Water Disputes (Krishna Water Disputes, Kaveri Water Disputesetc).

TEXTBOOKS:

1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Environmental Science: towards a sustainable future by Richard T. Wright.2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy2007, BS Publications.
6. Introduction to Environmental Science by Y. Anjaneyulu, BS.Publications.
7. Ecology and Environment byP. D. Sharma, Published by Rastogi publications.