

MAHATMA GANDHI UNIVERSITY
Ph.D. COURSE WORK IN ENVIRONMENTAL SCIENCES
COURSE II – ADVANCES IN ENVIRONMENTAL SCIENCES

Unit I: Earth and Environment

Earth as a System of Interacting Components, Materials of the earth, Lithosphere, Atmosphere, Hydrosphere and Biosphere, Hydrologic cycle and groundwater, Hydrogeology and Geology and of Kerala.

Introduction, Ecosystems, Biodiversity and its significance, Biogeography of India, Critical eco-systems and landscape-level conservation, Laws and Policies of Govt.of India for biodiversity conservation.

Case studies: Biodiversity of Western Ghats, Human-Animal Conflict and resource sharing, Participatory forest management.

Unit II : Environment Management

Environment Management: Principles, tools-EIA,LCA ,Environment audit, Environment Management Systems, Environmental Planning and Management. Case studies – EIA

Resource Conservation – Renewable and non-renewable resources, Tools for the management of natural resources. Conservation strategies – policies and laws of GOI.

Disaster management – case studies

Unit III: Environmental Chemistry

Chemistry and environment (fundamentals), Thermodynamics (concepts of first and second laws in environment), fundamentals of green chemistry, Atmospheric chemistry, Air, Water and soil pollution, Ecotoxicology, Toxicity of metals, pesticides, radioactive minerals, flourides etc, Interaction of toxicants with environment, bioaccumulation and magnification, biomarkers, Role of microbes in biogeochemical cycles, Water treatment, recent advances in water purification, Case studies-air pollution, water pollution, soil pollution.

Unit IV : Analytical Techniques and Instrumentation

Chromatographic techniques, TLC,GC,HPLC,GC-MS,LC-MS,Electrophoresis, Microscopy, Fluorescence microscopy, SEM,AFM,TEM,Basics and applications of spectroscopy, UV,IR,Raman,NMR,AAS

Remote sensing & GIS: Mapping concepts: Satellite remote sensing – EMR,platforms, sensors, visual interpretation and elements, digital image processing; Aerial photography;Global positioning system; Geographic Information System – components, data structures, spatial analysis and modelling; applications in environment science and management.

Unit V: Environmental Biotechnology and Waste Management

Environmental Biotechnology: an overview, Biotechnological solutions to Environmental Pollution, Air, Water and Soil, Emerging trends in –Agro biotechnology, Ecological Engineering, Biodegradable plastics, Biotechnological methods in solid waste management, processing/treatment of hazardous wastes.

Reference

1. Stanley E. Manhan, Environmental Chemistry, CRC press 2005
2. Gary W.V. & Stephan J.D. (2000), Environmental Chemistry a Global Perspective, Oxford University Press, New York
3. Skoog, D.A and Leary, J.J. (1992), Principles of Instrumental Analysis, 4th ed., Saunders's College Publishing, Fortworth
4. Wathern Peter. Environmental impact assessment: theory and practice. Routledge London
5. Anjaneyulu Y. Environmental Impact assessment Methodologies. B S Publications Delhi
6. Abbasi S A Arya D S. Environmental Impact Assessment. Discovery New Delhi.
7. Rao Sasi Bhushana. Environment Management. Regal Publications New Delhi
8. Kluge Heiner. Environment Management. University of Technology and the institute of Scientific Co-Operation Dresden.
9. Sheldon Christopher Yoxon Mark. Environmental management systems. Earth scan London.
10. Kulkarni Vijay Ramachandra T V. Environmental Management. Capital Publishing Co. Newdelhi
11. Newman Michael C Clements William H. Ecotoxicology a Comprehensive treatment. CRC Press Florida.
12. Scragg Alan. Environmental biotechnology. Pearson Education Ltd England
13. Kluge Heiner Bitner Alfred Hohnhoiz Jurgen. Waste Management, University of technology and the Institute for Scientific Co-operation Dresden
14. Schneid Thomas D Collins Larry. Disaster management and preparedness, Lewis Publishers London
15. Singh Tej. Disaster management approaches and strategies, Akansha Publishing New Delhi
16. Mckinney Michael L Schoch Robert M. Environmental Sciences, Systems and solutions, Jones and Bartlett Publishers London
17. Morgan Michael D Moran Joseph M Wiersma James H. Environmental science, Managing Biogical and physical Resources. WMC Brown Publishers Newyork.
18. Bhatta B. Remote sensing and GIS, Oxford NewDelhi.
19. Wise Stephen. GIS Basics, Taylor and Francis London.