

Course related to Environment

Semester	Course Code	Elective I	Total Marks:100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
V	20UAQET504	Environmental Biotechnology			4	4

**Objectives**

- To have a deep knowledge in ecology and environmental cycles.
- To acquire knowledge about Biodiversity and its aspects.

**Course Outcome:**

On successful completion of the course, the students will be able to:

- CO1 Have a clear idea on biotic and abiotic factors
- CO2 Understand the significance of bioremediation and biodegradation
- CO3 Generate an interest in field of energy sources
- CO4 Identify and involve in waste management
- CO5 Develop a basic idea regarding to Environmental Impact Assessment

**UNIT I**

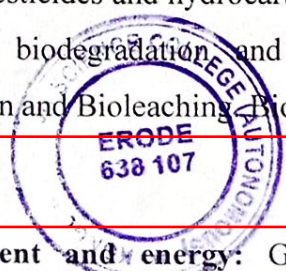
**Introduction to Ecology:** Scope and branches of ecology, Abiotic factors (water, soil, temperature, light. Biotic factors – Animal relationship, Symbiosis, Commensalisms, Mutualism, Antagonism , Antibiosis, Parasitism, Predation, Competition. Structure of pond and forest ecosystem, primary production, secondary production, food chain, food web, trophic levels, energy flow, ecological pyramids. Ecological succession, Biogeochemical cycle: Nitrogen and Phosphorous.

**UNIT II**

**Bioremediation and Biodegradation:** Bioremediation, Biodegradation - Factors affecting process of biodegradation; Methods in determining biodegradability; Biodegradation of plastics, pesticides and hydrocarbons. Xenobiotics - Use of microbes (bacteria and fungi) and plants in biodegradation and Biotransformation. Bioaccumulation, Biomagnifications. Biosorption and Bioleaching. Biosensors and Bioindicators for detection of pollution.

**UNIT III**

**Environment and energy:** Generation of energy and fuel using microorganisms (Hydrogen production and Methane production). Biomass –Plant, Animal and Microbial Biomass. Biomass as source of energy. Production of Bioethanol and Biomethanol.



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**Applications of Nanotechnology in Environment:** Nanotechnology for environmental decontamination – Heavy metal pollution remediation, Solid waste remediation, Groundwater and wastewater remediation, Hydrocarbon remediation. Single enzyme nanoparticles in bioremediation.

#### UNIT IV

**Waste Management:** Solid waste – Classification and types of solid wastes and solid waste management. Integrated solid waste management – Components of ISWM and Benefits of ISWM. E-waste: Composition of E- waste, E – waste management, E – waste management in India. Radioactive waste: Classification of radioactive wastes, Management of radioactive wastes. Biohazardous waste management.

#### UNIT V

**Environmental Impact Assessment (EIA):** Need of EIA; Scope and objectives; Types of environmental impacts; Steps involved in conducting the EIA Studies; Environmental Impact Assessment techniques-Ad-hoc method, checklist method, overlay mapping method, network method, simulation and modeling technique, matrix method, and system diagram technique; Merits and Demerits of EIA studies.


#### TEXT BOOK

1. Sharma, P.D, Ecology and environment. XI Edition Rastogi publications, Meerut, 2011.
2. Sulphey MM and Safer MM, Introduction to Environment Management, III Edition, PHI Learning Pvt. Ltd., 2015 (Unit IV)

#### REFERENCES

1. Durga Natha Dhar, Shalin Kumar, Triloki Vaish, Environment and Ecology, 1<sup>st</sup> edition, Vayu Education of India, 2009.
2. M. H. Fulekar, Bhawana Pathak, Environmental Nanotechnology, I Edition CRC Press, 2017
3. Nicholas P. Cheremisinoff, Biotechnology for Waste and Wastewater Treatment, Elsevier Science, 2013.



  
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### QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit

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