

BIO AND CHEMICAL TECHNOLOGY APPLICATIONS IN WASTE MANAGEMENT

Paper Code: ETEN-420	L	T/P	C
Paper: Bio and Chemical Technology Applications in Waste Management	3	1	4

INSTRUCTIONS TO PAPER SETTERS:

MAXIMUM MARKS: 75

1. Question No. 1 should be compulsory and cover the entire syllabus. This question should have objective or short answer type questions. It should be of 25 marks.
2. Apart from Question No. 1, rest of the paper shall consist of four units as per the syllabus. Every unit should have two questions. However, student may be asked to attempt only 1 question from each unit. Each question should be of 12.5 marks.

Objective: This course aims to describe biotechnological solutions to address environmental issues including pollution, water recycling and other key areas. The course also deals with Bio Sensors for detection of pollution, analysis of dose-effect relationship and risk assessment.

UNIT I

Environmental Biotechnology: Principles and concepts, Degradation of highly concentrated toxic pollutants. Mechanisms of detoxification, Oxidation, Dehalogenation, Biotransformation of metals, Bio absorption of metals.

Use of microscopy in environmental application.

Bio-fuel (Biodiesel and Ethanol): Preparation/ Production of bio-fuel., Advantages of bio-fuel, Evaluation of toxicity of bio-fuel.

[T1, T2][No. of Hours: 12]

UNIT II

Use of Biotechnology for Pest Control, Desulphurization of coal and oil, hazardous waste treatment, solid waste management and treatment of Wastewater.

Bioremediation: In situ and ex situ techniques, Biosparging, Bioventing, Injection recovery, Land farming, Soil banking and soil slurry reactor techniques, Planning and management of bioremediation and environmental biotechnology processes.

[T1, T2][No. of Hours: 11]

UNIT III

Phytotechnology: Plants as bioreactors, Phyto-remediation, Phyto-extraction, Rhizo-filtration, Phyto-stabilisation, Phyto-degradation and phyto-volatilisation, Phyto-mining, Macrophyte based waste- water treatment systems, Algal effluent treatment systems and their limitations.

[T1, T2][No. of Hours: 11]

UNIT IV

Biosensors in detection of Environmental Pollutants: BOD sensor, Methane sensor, Ammonia and nitrate sensor, modeling of Bioreactors.

Bio-depollution of soils contaminated by radio elements.

Environmental impacts of pollutants and analysis of dose-effect relationship.

Environmental effects and ethics in microbial technology, Genetically engineered organisms, Microbial containment, Risk assessment.

[T1, T2][No. of Hours: 12]

Text Books:

- [T1] Mohapatra P.K., "Textbook of Environmental Biotechnology", I.K. International Publishing House (P) Ltd., New Delhi.
- [T2] Thakur I.S., "Environment Biotechnology basic concepts and applications", I.K. International Publishing House (P) Ltd., New Delhi.

Reference Books:

- [R1] Wang L.K., Ivanov V., Tay J., Hung Y., "Environmental Biotechnology", Humana Press.
- [R2] Martin .A.M, "Biological degradation of wastes", Elsevier Applied Science, London.
- [R3] Aggarwal S.K., "Advanced Environmental Biotechnology", APH Publishing, New Delhi.
- [R4] Jee C., Shagufta, "Environmental Biotechnology", APH Publishing, New Delhi.