
IV Year B.Tech. Biotechnology	I - Semester	L	T	P	To	C
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BT 413 ENVIRONMENTAL BIOTECHNOLOGY (Elective-III)

Course Description & Objectives:

The main objective of this course is to impart students an understanding of pollution of environment by air, water and soil responsible for degradation of natural resources and degradation of biodiversity. The course also provides a fundamental knowledge of biological methods used in safeguarding the environment by waste treatment, energy production from waste and biological methods for minimum pollution formation.

Course Outcomes:

Upon completion of the course, the student will:

1. Be able to conceptually differentiate old biotechnology from modern biotechnology.
2. Become aware of the importance of conserving soil microorganisms in order to maintain the ecological balance
3. Acquire thorough understanding about the various waste water treatment systems.
4. Be able to design and develop small scale waste water management systems
5. Be able to utilize the potential of microorganisms for bioremediation and biodegradation.

UNIT I : INTRODUCTION :

Origin and Definition of old and new biotechnology, Biotechnology a multidisciplinary growing tree, scope and importance of Biotechnology in India. Environmental Pollution-soil, water air, oil and heavy metal pollution, Types and causes and its effects on environment. Microbial flora of soils.

UNIT II: BIOGEOCHEMICAL ROLE OF SOIL MICROORGANISMS :

Microbial flora of soil–Interactions among soil microorganisms–Nitrogen cycle–Carbon cycle–Sulfur cycle–Phosphorus cycle

UNIT III : BIOMASS :

Types and composition of biomass, waste as renewable source of energy, methods of energy production, energy and fuel using microorganisms, conversion of methane to synthetic gas, cellulose as a source of energy, conservation of energy.

UNIT IV: INDUSTRIAL WASTE WATER MANAGEMENT :

Aerobic and anaerobic waste water treatment, sewage disposal and treatment – physical and biological treatment, effluent treatment – primary and secondary treatment. Biological nitrogen and phosphate removal waste water treatment in dairy, distillery, tannery, sugar and industry pulp.

UNIT V : BIOREMEDIATION AND BIODEGRADATION :

Pseudomonas for bioremediation, types and reactions of bioremediation, biodegradation of hydrocarbons and pesticides, microbes in leaching of metals – leaching of copper and uranium, Control of air pollution, control devices for gaseous pollutants, volatile organic pollutants.

TEXT BOOKS :

1. Casida Jr, L.E., *Industrial Microbiology*, New Age International (P) Ltd.2007
2. Bhattacharya, B.C. and Banerjee, R., “Environmental Biotechnology”, Oxford University Press,2007.

REFERENCE BOOKS :

1. Bioremediation Engineering: Design and application – John T, Cookson Jr., McGraw Hill, Inc., (1985).
2. Environmental Biotechnology (2005) by A. H. Scragg (Author), Alan Scragg, Oxford University Press.
3. Foster C.F. John ware D.A. Environmental Biotechnology, Ellis, Honwood Ltd. 1987.

