BTC DSC 102T
ENVIRONMENTAL BIOTECHNOLOGY

Contact Hours: 45
Full Marks = 100 [ESE (70) CCA (30)]

Course Objective: *The objective of the course in Environmental Biotechnology is to provide students with an understanding of the principles and applications of biotechnology in addressing environmental challenges. The course aims to introduce students to various topics such as conventional and modern fuels, sewage and waste treatment, bioremediation techniques, biofertilizers, biocontrol agents, bioleaching, nanotechnology, and environmental monitoring. Through theoretical knowledge and practical examples, the course intends to equip students with the necessary skills to develop sustainable solutions for environmental issues using biotechnological approaches.*

UNIT I *(10 Lectures)*

Conventional fuels and their environmental impact: firewood, plant, animal, water, coal and gas. **Modern fuels and their environmental impact**: methanogenic bacteria, biogas; microbial hydrogen production; conversion of sugar to alcohol.

UNIT 2 *(8 Lectures)*

Sewage/Waste treatment: composition of sewage; treatment of municipal waste and industrial effluents. **Waste management and energy production:** composting; vermicomposting; biogas production.

UNIT 3 *(9 Lectures)*

Bioremediation techniques: bioremediation of soil & water contaminated with oil spills, heavy metals and detergents; degradation of cellulose using microbes; degradation of pesticides by microorganisms; phytoremediation and mycoremediation; biostimulation and bioaugmentation. .

UNIT 4 *(8 Lectures)*

Biofertilizers: nitrogen fixers, mycorrhiza, VAM. **Biocontrol agents**: biological control of pests and diseases. **Biopesticides.**

UNIT 5 *(10 Lectures)*

Bioleaching: microbial enrichment of ores (gold, copper and uranium) **Nanotechnology:** principle and applications. **Environmental Monitoring:** use of biosensors, remote sensing and GIS for environmental analysis. .

Course Outcomes: *The Environmental Biotechnology course equips students with a deep understanding of the environmental impact of fuels, sewage composition, waste management techniques, bioremediation methods, biofertilizers, biological control agents, bioleaching, nanotechnology applications, and environmental monitoring tools. By the end of the course, students will have the knowledge and skills to address environmental challenges, contribute to sustainable practices, and make informed decisions in the field of biotechnology and environmental science.*

SUGGESTED READING

1. Odum EP, Barrett GW (2004) Fundamentals of Ecology (5th ed.). Brooks/ Cole Publishers
2. Evans G, Furlong JC (2010) Environmental biotechnology: Theory and application. Oxford: Wiley-Blackwell
3. Fulekar MH (2010) Environmental biotechnology. Science Publishers
4. Jordening HJ, Winter J (2005) Environmental biotechnology: Concepts and applications. Wiley-VCH
5. Rittmann BE, McCarty PL (2001) Environmental biotechnology: Principles and applications. McGraw-Hill
6. Scragg AH (2005) Environmental biotechnology. Oxford University Press
7. Vallero D (2010) Environmental Biotechnology: A Biosystems Approach. Elsevier