

20BT013 ENVIRONMENTAL BIOTECHNOLOGY

Hours Per Week :

L	T	P	C
3	-	-	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	-	-	-	-	-	-	-

Course Description and Objectives:

To introduce students to how the common environmental experiments relating to water and wastewater quality are performed.

This course will help students know which tests are appropriate for given environmental problems, statistically interpret laboratorial results and write technical reports, and apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.

Course Outcomes:

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

- Perform common environmental experiments relating to water and wastewater quality, and know which tests are appropriate for given environmental problems.
- Statistically analyse and interpret laboratorial results.
- Apply the laboratorial results to problem identification, quantification, and basic environmental design and technical solutions.
- Understand and use the water and wastewater sampling procedures and sample preservations.

SKILLS:

- ✓ Determination of Specific Gravity, Bulk Density and Moisture Content of a given soil sample.
- ✓ Determination of Organic Carbon, NPK and CEC of a given soil sample
- ✓ Determination of Bioavailable and Total Heavy Metals in soil.
- ✓ Quantitative and qualitative characters of plant communities Ecological sampling of an area (line transect and quadrat method) "species-area" curve method.

ACTIVITIES:

- Environmental monitoring of the pollutants from land and water.
- Bioremediation of pesticides
- treatment and analysis
- Calculation of COD and BOD
- Environmental risk assessment studies
- Seminar presentation on Environmental Biotechnology

Unit-I

EFFLUENT TREATMENT – AEROBIC TREATMENT: Treatment of domestic and industrial waste waters – physical, chemical and biological, aerobic treatment methods – trickling filters, towers, RBC (rotating biological contactors), air sparged reactors, FBR (fluidized bed reactor), IFBBR (inverse fluidized bed biofilm reactor), expanded bed reactor, packed bed reactors, activated sludge process

Unit-II :

EFFLUENT TREATMENT – ANAEROBIC TREATMENT: Anaerobic digestion, anaerobic digesters, anaerobic filters, UASB (up flow anaerobic sludge blankets). Case studies on biological wastewater treatments.

Unit-III :

BIOREMEDIATION: Introduction, biostimulation, bioaugmentation, insitu, exsitu, intrinsic and engineered bioremediation, solid phase bioremediation – land farming, prepared beds, soil piles, Phytoremediation, compositing bioventing, biosparging.

Unit-IV :

XENOBIOTICS: Introduction to xenobiotics and their biodegradation, biological detoxification, hazardous waste management of cyanide, oxalate, urea and phenols.

Unit-V :

APPLICATION OF BIOTECHNOLOGY IN MINING & FUELS INDUSTRY: Metal biotechnology of copper and iron, microbial transformation, accumulation and concentration of metals, metal leaching Production of non conventional fuels like hydrogen, alcohols and biogas, use of microorganisms in improvement of oil recovery.

Text Books :

1. L.E. Casida, JR. "Industrial Microbiology", 2nd ed., New Age International (P) Ltd., New Delhi, 2006.
2. S.N.Jogdand, "Environmental Biotechnology", 3rd ed., Himalaya Publishing, 2007.
3. Pradipta Kumar Mohapatra, "Text book of Environmental Biotechnology", IK International Publishing House (P) Ltd., New Delhi, 2006.

Reference Books :

1. Martin Alexander, "Biodegradation and Bioremediation" , Academic Press, 1999.
2. Foster C.F. John ware D.A. "Environmental Biotechnology", Ellis, Horwood Ltd. 1987.
3. Karnely D. Chakrabarty K. Ovnem G.S. "Biotechnology and Biodegradation", Advances in Applied Biotechnology series, Vol. Gulf Publications Co. London, 1989.