

**SARDAR PATEL UNIVERSITY**  
**Programme: MSC (Microbiology)**  
**Semester: IV**  
**Syllabus with effect from: June 2011**

<b>Paper Code:</b> PS04CMIC02	<b>Total Credits: 4</b>
<b>Title Of Paper:</b> Environmental Biotechnology	

<b>Unit</b>	<b>Description in detail</b>	<b>Weightage (%)</b>
<b>1</b>	Issues and scopes of environmental biotechnology. Waste water treatment- Waste water characterization and its significance: COD, BOD, Inorganic constituents, solids, biological components. Primary, secondary and tertiary treatment of waste water. Principles and aims of biological wastewater treatment processes. Biochemistry and microbiology of inorganic phosphorus and nitrogen removal. Suspended growth technologies: Activated sludge, oxidation ditches, waste stabilization ponds. Fixed film technologies: Trickling filters, rotating biological contactors, fluidized bed and submerged aerated filters.	<b>25 %</b>
<b>2</b>	Toxicity testing in waste water treatment plants using microorganisms. Anaerobic digestion: microbiological and biochemical fundamentals, factors influencing anaerobic digestion. Anaerobic waste water treatment systems: RBC, UASB, anaerobic filters. Merits and demerits of anaerobic treatment of waste. Composting: Objectives, fundamentals, microbiology, factors influencing composting and composting systems. Compost quality and uses. Vermicomposting.	<b>25 %</b>
<b>3</b>	Biodegradation of organic pollutants: Mechanisms and factors affecting biodegradation. Pollution problems and biodegradation of simple aliphatic, aromatic, polycyclic aromatic hydrocarbons, halogenated hydrocarbons, azo dyes, lignin and pesticides. Bioremediation: Intrinsic bioremediation, Biostimulation and Bioaugmentation. In situ and ex situ bioremediation technologies. Bioremediation of oil spills. Bioremediation of heavy metal pollution, Phytoremediation. Use of GMO in bioremediation. Biological treatment of waste gas (polluted air): biofilters, bioscrubbers, membrane bioreactors, biotrickling filters.	<b>25 %</b>
<b>4</b>	Biogeotechnology- Bioleaching of metals: Characteristics of commercially important microbes, mechanisms of bioleaching, factors affecting bioleaching and current biomining processes. Biobeneficiation of gold ores. Microbially enhanced oil recovery. Biotransformation of coal: Removal of organic and inorganic sulphur from coal. Microbial Insecticides: Bacterial, fungal and viral insecticides in pest management. Biofertilizers: Nitrogen fixing and phosphate solubilizing biofertilizers.	<b>25 %</b>

**Basic Text & Reference Books:**

- Comprehensive Biotechnology Vol-4, Murray Moo Young.
- Biotechnology-Rehm and Reid.
- Waste water microbiology by G. Bitton
- Biodegradation and bioremediation by M. Alexander
- Waste water treatment for pollution control, 2nd edition. Arceivala
- Environmental Biotechnology by H. Jordening and Josef Winter
- Topic related review articles

