

ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY

Paper Code: ETEN-211

Paper: Environmental Chemistry and Microbiology

L	T/P	C
3	0	3

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 12.5 marks.

Objective: To provide detail understating of various aspects of chemistry, in specialized areas of environment management and practices. Also develop understanding of role of microorganisms and their activities of environmental and geochemical significance. Further, also develop conceptual understanding of metabolic processes catalysed by microorganisms related to major elemental cycles, biogeochemical processes and organic contaminant degradation.

UNIT – I

Fundamentals of chemical kinetics, Acid-base chemistry of natural waters, Acid deposition, Trace metals in water. Fundamentals of free radical chemistry, Smog and aerosols. Stratospheric ozone depletion, Health aspects of ozone depletion, BOD and COD tests

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

UNIT – II

Grab and Composite Sampling for natural water bodies and industrial Effluents, Monitoring techniques and toxic effects of organic compounds such as Phenols, Pesticides, Surfactants, Tannin, Lignin and Hydrocarbons. Environmental toxicity and analysis: Principles of toxicity and standards, Analysis of Chromium,, Cobalt, Manganese, Nickel, Copper, Mercury, Arsenic and Organo-metallic compounds. Chemical speciation of (Cu, Pb, As, Hg, Cr).

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

UNIT – III

Microorganisms in water and wastewater engineering: Characteristics of water and sewage, Microbial examination of water and wastewater, Taste and odours, coliform, bacteria tests, Heterotrophic Plate Count (HPC). Bacterial growth, Kinetics of bacterial growth, Acclimatization of waste and microbial inhibition. Biologically degradable Plastics and surface active substances. Microorganism in air pollution control (Bio filters and bio scrubbers).

[T1,T2][No. of Hours 10]

UNIT – IV

Bioremediation and Biore Restoration: Use of microbes for improving soil fertility, Restoration of soils contaminated with heavy metals/pesticides and other toxic organic chemicals. Biochemistry and Microbiology of Landfills and Composting, Recycling and processing of organic residues, Xenobiotics.

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

Text Books:

- [T1] Sawyer C.N., McCarty P.L. and Parkin G.F., "Chemistry for Environmental Engineering and Science", Tata McGraw Hill Publishing Company Ltd., New Delhi.
- [T2] Goel P.K., "Water Pollution, Causes , Effects and control", New Age International (P) Ltd., New Delhi.

Reference Books

- [R1] De A.K., "Environmental Chemistry ", New Age International (P) Ltd., New Delhi.
- [R2] Khopkar S.M., "Environmental Pollution Analysis", New Age International (P) Ltd., New Delhi.
- [R3] Bhatia S.C., "Environmental Chemistry", CBS Publishers and Distributors, New Delhi.
- [R4] Pelczar M.J., Chan E.C.S., Krieg N.R., "Microbiology", Tata McGraw Hill Education (P) Ltd., New Delhi.
- [R5] Dara S.S., "A Textbook of Environmental Chemistry and Pollution Control", S. Chand and Company Ltd., New Delhi.
- [R6] Pani B., "Textbook of Environmental Chemistry", I.K. International Publishing House (P) Ltd., New Delhi.