

EN502: Environmental Chemistry and Microbiology

Teaching Scheme			Credits	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	0	2	6	70	30	30	20	150

Course Content:

Sr. No.	Topics	Teaching Hrs.
1	<p><u>Basic concept of Physical Chemistry:</u></p> <p>Dissociation constant, Solubility and solubility product constant, Reversible Reaction, Equilibrium constant, Colloidal chemistry, Nuclear chemistry, Preparation of standard solutions.</p> <p>Water & Waste Water Analysis:</p> <p>Biological Oxygen Demand, Dissolved Oxygen, Chemical Oxygen Demand, pH, Turbidity, Color, Hardness, Acidity, Alkalinity, Solids, Volatile Acids, Oil & Grease, Chloride- Residual chlorine & Chlorine Demand, Fluoride, Sulphate, Nitrogen, Phosphorus and Phosphate, Iron, Manganese, Trace Contaminants.</p>	08
2	<p><u>Basic concept of Organic Chemistry:</u></p> <p>Introduction of IUPAC nomenclature, Introduction of Fats, Oils, Waxes, Detergents, Soaps, Synthetic Detergent, Pesticides-Chlorinated, Organic Phosphorous, Carbamate, s-Triazines and Biological properties of pesticides.</p>	06
3	<p><u>Instrumental methods of Chemical Analysis:</u></p> <p>Introduction and basic principle of followings;</p> <p>Gravimetry, Volumetry, Colorimetry, Chromatography, Fluorimetry, Flame Photometry, Polarography, Potentiometry, Mass Spectrometry, Nuclear Magnetic Resonance Spectroscopy.</p>	06
4	<p><u>Introduction to Microbiology:</u></p> <p>Scope and area of environmental microbiology, Major group of microorganisms. Morphology & fine structure of Bacteria.</p> <p>Microscopic examination of microorganisms-Simple and Compound Microscope, Stains & Staining-Simple staining & Gram's staining.</p>	06

5 **Cultivation of Bacteria:** 06

Nutritional requirements of Bacteria, Common ingredients of culture media, Bacteriological media.

Physical conditions requires for growth of Bacterial: Temperature, PH & oxygen.

Growth and growth cycle of Bacteria, Pure culture & Methods of isolation, Introduction to control of microorganisms by physical and chemical agents

6 **Environmental Microbiology:** 08

Soil microbiology - Microbial flora of soil and interaction among soil microorganisms.

Microbiology of domestic water and waste water- Bacteriological evidence of pollution, Bacteriological examination of water-MPN & Presumptive test, Waste water - chemical characteristics. B.O.D.

Waste water treatment process-septic tank.

Municipal treatment processes-Primary, Secondary, Final treatment

Total Hrs. 40

Reference Books:

1. Sawyer C.N, McCarty P.L and Parkin G.F, "*Chemistry for Environmental Engineering and Science*", 5th ed., Tata McGraw-Hill, 2003.
2. "*Standard Methods of Testing of Water and Wastewater*" Use by APHA, AWWA, AND WPCF (USA) – Latest Edition.
3. "*Physico Chemical Examination of Water Sewage and Industrial Effluents*", Pragati Prakashan, Meerut, India.
4. Manahan S.E., "*Environmental Chemistry*", Eighth Edition, CRC press, 2005.
5. Ronbald A. Hites., "*Elements of Environmental Chemistry*", Wiley, 2007.
6. Stanley E. Mahajan, "*Fundamental of Environmental Chemistry*", Lewis Publishers.
7. Plezar, Chan, Krieg, "*Microbiology*", McGraw Hill.
8. E. Gaudy and Gaudy, "*Environmental Microbiology*", McGraw Hill.
9. Maier, R.M., Pepper I.L. and Gerba C.P., "*Environmental Microbiology*", Academic Press, New York, 1999.
10. B. K. Sharma, "*Instrumental method of chemical analysis*", 17th Edition, Goel Publishing House, Meerut.
11. IS-3025.