AMEV-05 ENVIRONMENTAL CHEMISTRY

OBJECTIVES:

1 The objectives of the course are to study the basics of environmental chemistry, chemical reactions involved in water and electro kinetic properties.

UNIT I ENVIRONMENTAL CHEMISTRY: INTRODUCTION

Oxidation state, redox potential – chemical equilibrium, Le-Chatlier Principle - heterogeneous equilibria - solubility product - common ion effect, - application in water treatment.
Chemical kinetics - factors influencing the rate – order and molecularity (examples) – derivation of rate constant for first order reaction - time for half - change - nature of BOD reactions –Enzyme reactions, temperature dependence, catalyst.

UNIT II CHEMICAL REACTIONS OF WATER

Colloids, Classification – solids in liquids - hydrophilic and hydrophobic colloids – electrokinetic properties - chemical coagulation of water - Schulz Hardy rule - mechanism of coagulation electrodialysis - water purification – electro-osmosis - dewatering of sludges – electrophoresis – adsorption, Freundlich and Langmuir isotherms – Applications in pollution control.

UNIT III ORGANIC COMPOUNDS AND STRUCTURES

Functional groups in organic compounds and their structures (Preparation & Properties not required) - carbohydrates - classification – monosaccharides, pentoses (Xylose and arabinose) Hexoses (Glucose, galactose, mannose and fructose) – disaccharides (Sucrose, maltose and lactose) – Polysaccharides (Starch, cellulose and hemicellulose) - Structural formulae - ring structure and hydrolysis reaction only.

UNIT IV ATMOSPHERIC CHEMISTRY

Photochemical reactions in the atmosphere- Degradation of VOCs– Chemical process for the formation of inorganic and organic particulate matter – Photochemical smog.

UNIT V SOIL CHEMISTRY

Soil classification– Inorganic and organic components of soil –physical and chemical properties of soil- Acid -base and ion exchange reactions--Salt affected soil.

OUTCOMES:

The students completing the course will have

1 an insight into the chemical reactions in water, air and soil environment.
2 the ability to apply chemistry principles in analysing pollution of water, air and soil environment.
3 an understanding on the fate of chemicals on the environment and suggest relevant interventions.

TEXT BOOKS:

1 Stanley E.Manohar, Environmental Chemistry, Williard Grant, 1-75.
2 De.A.K. “Environmental Chemistry ", New Age International Ltd., New Delhi, 1--6.

REFERENCES:

1 Sawyer, C.N. and McCarty, P.L., and Parkin, G.F. “Chemistry for Environmental Engineers",3rd Edition. Tata McGraw Hill, New Delhi, 2013
2 Glasstone and Ceuris.D," Elements of Physical Chemistry", 1--7.
3 Albaigo J., "Analytical Techniques in Enviromental Chemistry", Pergamon Press, New York, 1-80.