

II SEMESTER

HARD CORE COURSES

ESH463 ENVIRONMENTAL CHEMISTRY

52 hrs.

Course Outcomes:

CO1 Understand the fundamentals of environmental chemistry with reference to atmospheric and water chemistry.

CO2 Understand the principles and basics of chemical reactions related to the environment.

CO3 Describe chemical composition of air and classification of elements.

CO4 Discuss on air pollutants and their reactions in the atmosphere.

CO5 Describe the chemical properties of water.

CO6 Develop skills on chemical property of environment.

UNIT I (13 hours)

Fundamentals of Environmental Chemistry: Stoichiometry, Gibbs' energy, chemical potential, chemical equilibria, acid-base reactions, solubility product, solubility of gases in water, the carbonate system, unsaturated and saturated hydrocarbons, radioisotopes in the environment.

Chemical reactions and equations, solutions, units, sampling, and analytical techniques.

UNIT II (13 hours)

Atmospheric chemistry: Chemical composition of Air. Classification of elements, chemical speciation. Particles, ions and radicals in the atmosphere. Chemical processes for formation of inorganic and organic particulate matters. Thermochemical and photochemical reactions in the atmosphere. CFCs, Oxygen and Ozone chemistry, chemistry of air pollutants, photochemical smog.

UNIT III (13 hours)

Chemical pollution and fundamentals of chemical reactions: Oxidation, reduction, precipitation. Toxic chemicals in the environment, biochemical aspects of As, Cd, Pb, Hg, CO, O₃, PAN, pesticides, MIC and carcinogens in air. Effects of Chemical Pollution.

UNIT IV (13 hours)

Water chemistry: Properties of water, types of reactions in various water bodies including marine environment. Chemistry of oil based and water based paints, physico-chemical basis of redox processes. Electrochemical theory of corrosion.

References:

1. Ajay Kumar Bhagi and Chatwal, G.R. Text book of Environmental Chemistry.
2. Bhatia, S.C. 2011. Environmental Chemistry, CBS Publishers.
3. Day, A.K. 1984. Environmental Chemistry, Willey Eastern, III Ed.
4. Faust, S.D. and Dly, O.M. 1983. Chemistry of water treatment.



5. Manahan, S.E. 2000. Environmental Chemistry, 7th Ed., Lewis Publications, Florida, U.S.A.
6. Sharma, B.K. and Kaur. 1995. Environmental Chemistry, Goel Publishing House, Meerut.
7. Sawyer, C.N., Mc Marty, P.L. and Perkin G.F. 1994. Chemistry for Environmental Engineering, II Ed., Mc Graw Hill.
8. Tyagi, O.D. and Mehra, M. 1990. Environmental Chemistry, Anmol Publications.

ESH464 OCCUPATIONAL HEALTH HAZARDS

52 hrs.

Course Outcomes:

CO1 Gain the knowledge of occupational environment.

CO2 Know the different occupational health hazards.

CO3 Understand the protective measures for health of workers.

CO4 Get the knowledge of occupational diseases.

CO5 Study on health hazards in industrial environment which support employability related to environmental awareness.

UNIT I (13 hours)

Occupational Environment - Occupational hazards- Physical, chemical, Biological. Occupational diseases- Pneumoconiosis- silicosis, Anthracosis, Byssinosis, Bagassosis, Asteatosis, Farmers lung, Lead poisoning, Occupational cancer, Occupational Dermatitis, Radiation hazards.

UNIT II (13 hours)

Occupational hazards of agricultural workers- somatic diseases, accidents, toxic hazards, physical hazards, respiratory diseases, accidents in industry, sickness absenteeism, health issues due to industrialization.

UNIT III (13 hours)

Measures for securing safety and health of workers, prevention of occupational diseases- medical measures, engineering measures. Legislation - The Factories Act, 1948. Human health problems due to pollution, public health programs. Food borne diseases: Types, symptoms and prevention. Food poisoning - types of food poisoning, prevention and control, indicators of health, food safety.

UNIT IV (13 hours)

Airborne allergens, seasonal changes, mode of dispersal, disease intensity and control. Influence of physical environment features on Accidents and Crime. Waterborne diseases - Prevention and protection of community health from waterborne diseases.

References:

1. Beaglehole, R., Bonita, R. and Kjellstrom, T. 2006. Basic epidemiology.
2. Benjamin O. Ali. Fundamental principles of occupational health and safety, Handbook of Occupational Safety and Health.
3. David N. Petley. Environmental Hazards: Assessing Risk and Reducing.
4. Gloria J. Hathaway, Nick H. Proctor, James P. Hughes. Chemical Hazards of the Workplace.