

20MSC505T					Environmental and Green chemistry					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs/Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
2	0	0	2	2	25	50	25	--	--	100

COURSE OBJECTIVES

- To develop the fundamental understanding about aquatic and atmospheric chemistry.
- To provide the knowledge about the experimental methods in environment chemistry.
- To develop the fundamental knowledge about green chemistry and its importance.
- To provide the awareness about the greener chemicals and approaches.

Unit 1: Aquatic and atmospheric chemistry**7h**

Aquatic chemistry principles of sedimentation, coagulation, precipitation, concept of solubility product, filtration and adsorption process, photochemical oxidants, smog formation, acid rain, nuclear accidents, global warming, carbon sequestration, toxic chemicals in environment, trace metal characteristics in relation to toxicity, biochemical effects of trace elements, biochemical effects of nitrogen oxides, sulphur dioxide, nitrate, fluoride, carcinogens, methyl isocyanate.

Unit 2: Experimental methods in environment chemistry**6h**

Introduction and sampling techniques: Sample preparation, preservation and processing of air, water and soil samples; precipitation, fractional distillation, solvent extraction, air sampling equipments, particulate matter, its measurement and practical importance, characterization of water quality - alkalinity, hardness, electrical conductivity, pH, chlorides, fluoride, nitrates, origin and treatments of industrial wastes

Unit 3: Green chemistry and importance**7h**

Introduction to green chemistry, importance of green chemistry, natural and synthetic processes, twelve principles of green chemistry, concept of atom economy with examples, role of solvents in green chemistry, organic and aqueous solvents, water as green solvent, solvent less reactions, industrial hazards and safety precautions, types of hazards, hazard assessment in chemical industry, green synthesis examples: Ibuprofen, adipic acid, ammonia, sulfuric acid.

Unit 4: Greener chemicals and approaches**6h**

Properties and use of Ionic liquids, advantages of ionic liquids, biocatalyst and enzymes, different types of biocatalysts and their functions, alternative energy sources for green chemistry, microwave synthesis; advantages with example, sonochemical synthesis: mechanism and examples; combinatorial synthesis: different approaches and examples.

COURSE OUTCOMES**On completion of the course, student will be able to**

- CO1 - Understand the basic principles of aquatic chemistry.
 CO2 - Acquire knowledge about the chemical processes occurring in the environment.
 CO3 – Understand and learn the fundamentals to monitor the air and water quality.
 CO4 – Explain the definition of green chemistry and characterizing chemical reactions in terms of green chemistry.
 CO5 – Acquire knowledge about the industrially important green chemical processes.
 CO6 - Develop the knowledge on the green chemicals and greener synthesis approaches.

References

1. Environment Chemistry, Garry W. vanlon & Stephen J. Duffy, Oxford University press, third edition, (2011)
2. Chemistry for Environmental Engineering and Science, C.N. Sawyer, PL McCarty, G.F. Parkin, Tata Mc. Graw-Hill Edition, 2003.
3. Environmental Engineering, Principles and Practices, N.S. Varandani, Pearson publications.
4. Sheldon, R.A., Arends, I., and Hannefed, U., Green Chemistry and Catalysis, Wiley-VCH Verlag GmbH and Co. (2007).
5. Handbook of green chemistry and technology by Clark J, WILEY (2014)