SEMESTER-I
Paper S- 1044:
Environmental and Green Chemistry

Time: 3 Hrs. **M.M. 75 marks**
Note: The paper will be divided into two sections.

Section-A One question with 10 parts (short answer word limit 20) spread over whole syllabus. Each part will be of 1 mark and candidate is required to attempt all the ten parts

Total 10 marks

Section-B Five questions (answer not exceeding 500 words) are from each Unit with internal choice will be asked and the candidate is required to attempt all five questions. Each question will be of 13 marks

Total 65 marks

UNIT I

Principle and concepts of Green Chemistry:-Introduction, definition, principles, atom economy, atom economic and atom uneconomic reaction, reducing toxicity.

Waste- Production, Problems and Preventions: Introduction, problem caused by waste, source of waste, cost of waste, waste minimization techniques, on-site waste treatment, design for degradation, polymer recycling.Introduction to catalysis, biocatalysit and phase transfer catalysis.

UNIT-II

Green Solvents: Organic solvents, solvent-free systems, controlling of solvent-free reactions, supercritical fluids (H_2O and CO_2) ,fluorous biphase solvents.

Green Reagents: Introduction, methods of designing safer chemicals, avoidance of toxic functional groups, examples of greener reagents including replacement of phosgene, methylations using dimethyl carbonates and other polymer supported reagents, solid state polymerization, alternative nitrile synthesis.

UNIT-III

Green Synthesis: Design for energy efficiency, classification and applications of Green Synthesis including Microwave Assisted Synthesis green synthesis of polycarbonates, paracetamol, ibuprofen, citral, urethane, adipic acid, styrene, α,β-unsaturated nitroalkenes.

UNIT-IV

Environmental chemistry: Atmosphere –chemial and photochemical reactions in the atmosphere, oxgen and ozone Chemistry, green house gases and effect, hydrosphere-physical chemistry of sea water, eutro phication, sewage treatment, lithosphere and chemistry envolved, smoke formation acid rains. A brief idea of toxicological effects of arsenice, lead, cadmium mercury, ozone PAN, cyanide, pesticides. Oxide of nitrogen, sulphur and carbon, carcinogens

UNIT-V

Analysis of pollution: Sampling and monitoring of air and water, determination of total dissolved solids, conductivity , acidity, alkalinity, harnnes, chloride, sulphate, fluoride phosphate and different forms of nitrogen phenols, pestisides, surfactants DO, BOD, COD and microorganism. Catalysts of aquatic chemical reactions water pollution lows and standards.

Books Suggested:

1. Green Chemistry: An Introductory Text, Mike Lancaster, Royal Society of Chemicals, Cambridge,
2. Green Chemistry: Frontiers in Benign Chemical Synthesis and Processes, Edited by Paul T. Anastas & Tracy C. Williamson, Oxford University Press.
3. Green Chemical Syntheses and Processes: Edited by Paul T. Anastas, Lauren G. Heine & Tracy C. Williamson, ACS Symposium Series.
4. Green Chemistry: Environment Friendly Alternatives, Edited by Rashmi Sanghi, M. M. Srivastava, Narosa Publishing House, New Delhi.
5. Green Chemistry: Microwave Synthesis, K. R. Desai, Himalaya Publishing House.
6. Green Chemistry: A Teaching Resource, Dorothy Warren, Royal Society of Chemicals, 2001.
7. Green Chemistry: Williams, Charlotte.
8. Environmental Chemistry, S. E. Manahan, Lewis Publishers.
9. Environmental Chemistry, Sharma & Kaur, Krishna Publishers.
10. Environmental Chemistry, A. K. De, Wiley Eastern.
11. Environmental Pollution Analysis, S.M. Khopkar, Wiley Eastern
12. Standard Method of Chemical Analysis, F.J. Welcher Vol. Ill, Van Nostrand Reinhold Co.
13. Environmental Toxicology, Ed. J. Rose, Gordon and Breach Science Publication.
14. Elemental Analysis of Airborne Particles, Ed. S. Landsberger and M. Creatchman, Gordon and Breach Science Publication.

Environmental Chemistry, C. Baird, W. H.