SEMESTER-III
Paper S-3053

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 concept 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.

Unit-II

Green Solvents: Organic solvents, solvent-free systems, controlling of solvent-free reaction, 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. Introduction of catalysis, Biocatalysis and phase transfer catalysis.

Unit-III

Green Synthesis: Design for energy efficiency, classification and application of green synthesis including Microwave Assisted Synthesis, green synthesis of polycarbonates,

paracetamol, ibuprofen, citral, -unsaturatedurethane, a nitroalkenes.

Unit-IV

Environmental Chemistry: Atmosphere chemical and photochemical reaction in the atmosphere, oxygen and ozone chemistry, green house gases and effect, hydrosphere-physical chemistry of sea water, eutro-phication, sewage treatment, lithosphere and chemistry involved, smoke formation acid rains. A brief idea of toxicological effects of arsenic, 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, hardness, chloride, slphate, fluoride, phosphate and different forms of nitrogen, phenols, pesticides, surfactants DO, BOD and COD microorganism. Catalysis of aquatic chemical reactions, water pollution lows and standards.