

M.Sc. (Part-I) (Chemistry) (NEP Pattern) Semester-I
NEP-14-3 / 01MSCCH06 - Paper-VI : Green Chemistry

P. Pages : 2

Time : Three Hours



GUG/W/23/15075

Max. Marks : 80

Note : All questions are compulsory & carry equal marks.

1. a) How does the principle of minimizing waste generation play a crucial role in green chemistry, and what strategies and techniques can chemists employ to achieve this goal? **8**
- b) i) What is atom economy in chemistry and why is it important? **8**
ii) What role does green chemistry play in developing safer and less toxic alternatives to hazardous chemicals?

OR

- i) What are the twelve principles of green chemistry, and how do they guide the development of environmentally friendly and suitable chemical process and products? **4**
- ii) What are some examples of green solvents, and how do they differ from traditional solvents? **4**
- iii) How do immobilized solvent technologies contribute to reducing waste and improving the efficiency of chemical processes? **4**
- iv) What are the advantages of using ionic liquids in comparison to conventional organic solvents. **4**
2. a) Name the starting material and biocatalyst used for green synthesis of BHT (butylated hydroxy toluene) and catechol and explain its green synthesis? **8**
- b) How does the application of microwave irradiated in organic solvents affect the rates, selectivity and efficiency of various chemical reactions, what are the key factor and mechanism that govern these changes in the context of modern synthetic organic chemistry? **8**

OR

- i) What are the potential environmental benefits of using microwave-assisted reactions in water. **4**
- ii) Discuss the microwave assisted Hofmann Elimination and Hydrolysis reactions. **4**
- iii) What are the advantages of microwave assisted Claisen rearrangement. **4**
- iv) How does microwave-assisted synthesis enhance the conversion of an aldehyde to a nitrile? **4**

3. a) Give the applications of ultrasound assisted esterification, saponification and substitution reactions? 8
- b) i) How does the frequency and intensity of ultrasound waves impact organic reactions? 8
ii) What are the key advantages of ultrasound assisted Cannizzaro reactions?

OR

- i) What are the key benefits of combining biocatalysis with ultrasound in organic synthesis? 4
- ii) What role does clayan play in improving the dispersion and stability of reactants during sonication. 4
- iii) How does ultrasound assist in solid state polymerization processes? 4
- iv) How does ultrasound enhance free radical bromination reactions? 4
4. a) How do you envision the future trends in green chemistry, specially in the development and applications of biomimetic and multifunctional reagents? 8
- b) Explain different techniques used in combinatorial synthesis. Also write the applications of combinatorial chemistry? 8

OR

- i) How is microwave energy utilized in chemical processes to enhance reaction efficiency and reduce energy requirements? 4
- ii) What are the advantages and challenges associated with the proliferation of solventless reactions in green chemistry? 4
- iii) How do green chemistry principles reduce the potential for hazardous chemical accidents? 4
- iv) How does the adoption of green chemistry benefit both the environment and society's long-term sustainability? 4
5. a) How do green solvent differ from traditional solvents? 2
- b) What role does green chemistry play in reducing chemical waste? 2
- c) What are the advantages of using microwaves in chemical synthesis? 2
- d) What are the eco-friendly methods for synthesizing adipic acid? 2
- e) How does ultrasound enhance the coupling reaction. 2
- f) How is tellurium used in organic synthesis? 2
- g) What analytical techniques minimize hazardous substances? 2
- h) What is combinatorial green chemistry? 2
