



K23P 0160

Reg. No. : .....

Name : .....

IV Semester M.Sc. Degree (CBSS – Reg./Supple./Imp.)

Examination, April 2023

(2019 Admission Onwards)

CHEMISTRY

CHE4C.12 : Inter Disciplinary Topics and Instrumentation Techniques

Time : 3 Hours

Max. Marks : 60

SECTION – A

(Answer **all** questions in **one** word or **one** sentence. **Each** question carries 1 mark.)

1. Give any two examples for molecules having intra-molecular hydrogen bonding.
2. Calculate the atom economy for the following reaction.  
$$\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{HCl}(\text{g})$$
3. What is the role of hydrophobicity in self-assembly ?
4. How percentage yield of a reaction differs from atom economy ?
5. Give any two examples for piezoelectric materials.
6. What is lithography ?
7. How the extent of scattering from a particle vary with the wavelength of light ?
8. How many ESR lines are expected for methyl radical ?

SECTION – B

(Answer **any eight** questions. **Each** question carries 2 marks.)

9. How you manage solvents in a *green* synthesis ?

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10. What are biomimetic nanomaterials ?
11. What is the role of solvents in the self-assembly of organic molecules ?
12. Is it possible to perform aldol condensation reaction in a greener way ? Explain.
13. What is meant by amphiphile ? How it helps in self-assembly ?
14. What is Doppler shift in Mossbauer spectroscopy ?
15. What do you understand about a co-receptor molecule ?
16. Explain any two applications of turbidimetry.
17. Explain any one microwave assisted organic synthesis.
18. Explain the significance of self-assembly in nanotechnology.
19. What are the applications of nanomaterials in optics ?
20. What is zero field splitting in ESR spectroscopy ?

### SECTION – C

(Answer **any four** questions. **Each** question carries **3** marks.)

21. How AFM is used to characterize self-assembled nanostructures ?
22. Write a short note on molecular recognition.
23. What are the advantages of phase transfer catalysts in green chemistry ? Explain with examples.
24. How electron microscopy can be used to characterize nanomaterials ? Explain with an example.
25. Compare the classical Cannizzaro reaction with green chemistry method.
26. In bottom up synthesis, how nucleation and crystal growth processes decide the formation of nanomaterials ?
27. Explain the working of differential scanning calorimetry.
28. Explain the working of direct injection enthalpimetry.



SECTION – D

(Answer **four** questions. **Each** question carries **6** marks.)

29. Explain the applications of ESR spectroscopy in the identification of organic radicals.

OR

Explain the theory and applications of Mössbauer spectroscopy.

30. Explain the following nanostructures with examples

- i) nanotubes
- ii) nanofibers and
- iii) nanobricks.

OR

Explain the applications of nanomaterials in

- i) Environmental sustainability
- ii) Medical diagnosis and
- iii) Drug delivery.

31. Write and explain the principles of Green chemistry.

OR

Explain the role of green chemistry in

- i) Reaction time
- ii) Energy benefits and
- iii) Solvent selection.

32. How supramolecular chemistry is used to explain host-guest interactions and molecular recognition ? Explain with examples.

OR

Explain any three microscopy techniques used for the characterization of supramolecules.

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