Question Bank

Materials and Green Chemistry

1. What are nanomaterials? Explain with suitable examples.
2. Describe the top-down and bottom-up approaches used in nanomaterials synthesis.
3. Classify nanomaterials based on dimensions with examples (0D, 1D, 2D, 3D).
4. Explain surface plasmon resonance (SPR) in metal nanoparticles.
5. Why do gold nanoparticles show red colour instead of metallic yellow?
6. Describe the structure of graphene with a neat diagram.
7. Explain the mechanical, electrical, and thermal properties of graphene.
8. What are polymers? Explain monomer, polymer, and degree of polymerization.
9. Classify polymers based on origin, structure, and mode of polymerization.
10. Distinguish between addition polymerization and condensation polymerization.
11. Define glass transition temperature.
12. Explain how polymer structure affects mechanical, thermal, and chemical properties.
13. Define number-average molecular weight (Mn) and weight-average molecular weight (Mw).
14. Explain the synthesis of PMMA (free-radical polymerization).
15. Describe the synthesis of epoxy resins (Bisphenol-A + Epichlorohydrin).
16. What are polymer composites? Give examples. And Explain the synthesis of Kevlar.
17. What are conducting polymers? Give examples.
18. Explain the mechanism of biodegradation in polymers.
19. What is an OLED? Name the key layers present in an OLED device. What are emissive and conductive layers in OLEDs?
20. Explain the concept of atom economy with a suitable example.
21. Write any six principles of green chemistry.

22. Explain the importance of green chemistry in sustainable development.
23. Write detailed notes on:
    a) Catalysis as a green alternative
    b) Use of renewable resources
24. Applications of conducting polymers in sensors, batteries, and electronics.
25. What are biodegradable polymers? Properties and degradation mechanisms and their applications in medicine, packaging, and agriculture.
26. Explain how carbon fibers are prepared (PAN or pitch-based).
27. List their properties: high strength-to-weight ratio, electrical conductivity.