LOYOLA COLLEGE (AUTONOMOUS) CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **CHEMISTRY**

FOURTH SEMESTER – **APRIL 2025**

16/17/18UCH4ES02 – MATERIALS SCIENCE

Date: 08-05-2025 Dept. No. Max. : 100 Marks

Time: 09:00 AM - 12:00 PM

SECTION A

Answer ANY FOUR of the following **4 x 10 = 40 Marks**

1. a) How are nanomaterials synthesized by sol-gel method?
   b) Discuss the electronic properties of CNTs. (5+5)
2. a) Explain the principle and steps involved in the preparation of nano particles using bottom-up approach.
   b) Differentiate between SWNT and MWNT. (6+4)
3. What are semiconductors? How are they classified?
4. a) Write the working principle of biosensor with example. (5+5)
   b) Deduce the mechanism of VOC sensors.
5. a) Explain the various types of magnetic materials with examples.
   b) Summarize the procedure for measuring the humidity of a sample. (5+5)
6. a) Discuss the kinetics of polymerization reactions.
   b) List any five differences between thermosetting and thermoplastics. (5+5)
7. a) How is the processing of polymers carried out by die casting method? Explain.
   b) Discuss the mechanism of anionic polymerization . (5+5)
8. a) What are the steps involved in the preparation of a polymer by emulsion polymerization?
   b) How is nylon-66 synthesized? Mention its uses. (6+4)

SECTION B

Answer ANY THREE of the following **3 x 20 = 60 Marks**

9. a) Outline the principle and instrumentation technique of SEM.
   b) Write the applications of superconducting materials. (10+10)
10. a) Describe Bardeen-Cooper-Schrieffer theory of superconductivity.
    b) Elaborate the principle and working mechanism of a photogalvanic cell. (10+10)
11. a) Explain the principle of biosensor and its applications in cancer diagnosis.
    b) Relate the heat and temperature sensor with suitable working mechanism. (10+10)
12. a) Describe the formation of silica nanoparticles and their unique properties.
    b) Specify the synthesis, recycling process of biodegradable polymers. (10+10)
13. a) Differentiate homopolymer and copolymer with examples.
    b) How are the following polymers prepared? (8+12)
    (i) Buna-S (ii) Polyester (iii) Polyvinyl chloride (iv) Polyethylene
14. a) Discuss the mechanism of preparation of polypropylene using Ziegler-Natta catalyst.
    b) Write a short note on the polymer degradation in the presence of oxygen and ozone. (10+10)
