



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2017

16PCH3ID01 - MATERIALS SCIENCE

Date: 13-11-2017
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions.

(10 × 2= 20)

1. Define unit cell of a crystal system.
2. Draw the crystalline planes for the miller indices (1 1 0) and (0 1 0).
3. Give the matrix representation for translation and inversion operation.
4. What is meant by Electron charge density map?
5. Define slip system in elastic properties of materials.
6. State the principle of photovoltaic cell.
7. Mention any two differences between type I and type II superconductors.
8. How is terylene prepared?
9. What are atactic polymers? Give an example.
10. State the principle of STM.

Part-B

Answer any EIGHT questions.

(8 × 5= 40)

11. Explain the rotation and reflection combinations of symmetry operations.
12. Obtain an expression for reciprocal lattice of a crystal plane.
13. Explain the Laue method of X-ray diffraction.
14. Describe the DSC method of studying the thermal characteristics of a material.
15. Discuss the various types of glide planes with a suitable diagram.
16. Explain the ionic polarization in dielectric behavior of a material.
17. Explain the phenomenon of hysteresis in ferromagnets with a neat diagram.
18. Discuss the fabrication of transistors using p-n junction.
19. Explain the factors affecting the thermal degradation of polymers.
20. Discuss the mechanism of ammonolysis of polyethylene terephthalate.
21. Explain the preparation of nanometal oxides by hydrothermal method.
22. Describe the role of injection moulding for the processing of polymers with a neat diagram.

Part-C

Answer any FOUR questions.

(4 × 10= 40)

23. Explain the method of Scanning Electron Microscopy (SEM) to study the structural properties of materials.
 24. Describe Bravais lattice of three dimensional crystal systems with a suitable diagram.
 25. Discuss the various types of dielectric breakdown.
 26. Define non-linear optics. Explain any two phenomena with suitable examples.
 - 27a. Write a short note on the secondary bond forces in polymers.
 - b. Explain the mechanism involved in the synthesis of polyisobutylene using cationic polymerization.
- (5+5)
28. What are core-shell nanoparticles? Explain their types, any one synthesis and any two properties for each.
