LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **CHEMISTRY**

THIRD SEMESTER – **NOVEMBER 2019**

17/18PCH3ID01 – MATERIALS SCIENCE

Date: 04-11-2019 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

Answer ALL questions. **(10 × 2= 20)**

1. Define Wigner-seitz unit cell.
2. Draw crystalline planes in a cubic unit cell having miller indices (1 1 0) and (1 0 0).
3. Give the matrix representation of symmetry operations, rotation and reflection at a point.
4. What is meant by slip system?
5. What do you mean by dielectric constant and dielectric loss?
6. Mention the two types of semiconductors with suitable examples.
7. What are superconductors? Mention any two applications.
8. Define weight average molecular mass of polymers.
9. State the principle of bulk polymerization.
10. What are nanomaterials? Give examples.

Part-B

Answer any EIGHT questions. **(8 × 5= 40)**

11. Obtain the reciprocal lattice vector of a bcc crystal system using vector algebra.
12. Explain the glide planes in detail.
13. Explain the classification of neutrons on the basis of their energy.
14. Explain the sample preparation method in SEM.
15. Describe Bridgeman Stockbarger method of crystal growth.
16. Discuss the phenomenon of electroluminescence.
17. Explain briefly about the Bardeen-Cooper-Schrieffer theory.
18. Write a short note on the stoichiometric defects.
19. Explain the various stages involved in the suspension polymerization and mention its advantages.
20. Discuss the mechanism of Ziegler-Natta polymerization.
21. Explain how the nanoparticles are synthesized by solvo-thermal and hydrothermal methods.
22. Discuss in detail the classification of nanoparticles.

Part-C

Answer any FOUR questions. **(4 × 10= 40)**

23. Explain the 3D bravais lattices with suitable examples and diagrams.
24. Explain the construction and operation of SEM with a suitable diagram.
25. Explain the different types of polarization in dielectric materials.
26. Write a short note on the following:
    i) Domain theory
    ii) Piezo and pyroecletric material.
27. a) How is the processing of polymers carried out by calendaring?
    b) Explain the preparation of any two conducting polymers.
28. Explain the principle and instrumentation of STM.

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