LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – NOVEMBER 2016

CH 3875 - MATERIAL SCIENCE

Date: 14-11-2016 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

Part-A

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

1. What is the logical expression for crystal structure?
2. What do you mean by screw axis?
3. Why are X-rays preferred for crystal diffraction?
4. Define the two types of gel.
5. Define stiffness of a material.
6. State the reason for the electrical conduction of (SN)x type of compounds.
7. How is p-n junction helpful in solar cell fabrication?
8. Give any two differences between type I and type II superconductors.
9. What is the special characteristic feature of $LiTaO_3$?
10. Mention any two differences between hard and soft magnets.

Part-B

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

11. Explain the procedure to obtain the miller indices of a crystal plane.
12. Define glide plane and discuss the types of glide plane.
13. Discuss the neutron diffraction method in crystal structure analysis.
14. Explain the TG/DTA method of Thermal Analysis.
15. Elaborate Bridgeman – Stockbarger method of crystal growth.
16. Discuss the atomic model of elastic behavior.
17. Explain the conduction behavior of 2D and 3D silicates.
18. Draw and explain the structure of sodium betaaluminate.
19. Discuss the significance of GMR effect in recording the magnetic data.
20. Distinguish between piezo and pyro electric materials with suitable examples.
21. Explain the role of NiTi alloy in blood clot and biomedical applications.
22. What are F centres? Explain with a suitable example.

Part-C

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

23. Discuss Bravais lattices of crystal system with suitable examples and diagrams.
24. Explain the scanning electron microscopy analysis for surface studies.
25. Describe rubber like elasticity in the elastic behaviour of a material.
26. What are photocatalysts? Explain any one application of photocatalysts in detail with a suitable example.
27. Define spontaneous magnetization. How is it helpful in hysteresis phenomenon? Explain.

28 a. How is optical mixing carried out using NLO materials? Explain. **(5)**

b. Briefly discuss the theory on Cooper pair of electrons. **(5)**

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