LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2009

CH 3875 - MATERIAL SCIENCE

Date & Time: 14/11/2009 / 9:00 - 12:00   Dept. No.   Max. : 100 Marks

PART A

Answer all the questions   10 x 2 = 20

1. State Meissner effect.
2. What are domains?
3. Define pyroelectric effect.
4. Mention the characteristic feature of shape memory alloys.
5. What is non-linear optics?
6. Distinguish between Vickers and Knoop hardness testing.
7. Write the expression connecting the Poisson ratio and the shear modulus.
8. Determine the Miller indices for the crystallographic intercepts of X,2Y and 4Z.
9. Mention the limitations of gel growth technique.
10.   What are the advantages of neutron diffraction method?

PART B

Answer any eight questions   8 x 5 = 40

11. Briefly explain the structure of Na^+ in β-alumina.
12. Write short notes on the conduction behaviour of chevereal phases.
13. How is GMR materials used in reading and recording data?
14. Distinguish type I and type II superconductors.
15. What are metal excess defects? Explain.
16. What are one- and two-dimensional silicates? Explain.
17. Explain the procedure to control the nucleation while growing crystals by gel method.
18. Using the powder XRD geometry discuss its operation and the procedure to find out the crystalline structure.
19. Discuss the instrumentation and working of SEM with the help of a block diagram.
20. Compare and contrast the functioning of DTA and DSC techniques.

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21. Explain the formation of glide and, mirror planes and screw axis.

22. What are composite materials? Compare their advantages over metals/polymers.

PART C

23. Explain the working principle and operation of Honda cell for the photolysis of water?

24. Discuss the B vs H plot of ferromagnetic materials.

25. What are stoichiometric defects? Explain the types with examples.

26. Describe the fourteen Bravais Lattices with the needed construction details along with the conditions involved in their formations.

27. Explain the basis of growth of crystals by low temperature method and the detailed experimental procedures involved in optimizing the growth conditions.

28. Draw the Bridgman-Stockbarger experimental geometry of high temperature method and explain its working.

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