LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – CHEMISTRY

SIXTH SEMESTER – APRIL 2010

CH 6608/CH 6602 - CHEMISTRY OF MATERIALS

Date & Time: 20/04/2010 / 9:00 - 12:00 Dept. No. Max. : 100 Marks

PART – A

Answer ALL questions. **(10 x 2 = 20 marks)**

1. Predict the type of hole for the following cation and anion. Fe^{2+} (r = 55 pm) and S^{2-} (r = 184 pm).
2. Represent (110) and (222) planes of bcc structure.
3. What quantity is measured in TGA and in DTA?
4. In hydrothermal process involving alumina, alkali is added to the reaction mixture. Why?
5. Mention the applications of pyroelectrics.
6. Selenium is a favoured material to be used as a photoconductor in photocopiers. Reason out.
7. State Curie-Weiss law.
8. Define magnetic susceptibility.
9. Explain the term *optimized ionic conductors*.
10. What is Meissner effect?

PART – B

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

11. $NiCr_2O_4$ is a normal spinel whereas $NiFe_2O_4$ is an inverse spinel. Explain.
12. Derive the Bragg equation for the diffraction of X-rays by crystals.
13. Draw the projection of unit cells of the following and explain the salient features of their structures. a) Wurtzite and b) fluorite
14. Write a note on non stoichiometric defects.
15. Explain the chemical vapour deposition method.
16. What is SEM? Give its applications.
17. Write a note on solar energy conversion.
18. Explain the functioning of lithium cells.
19. List out the applications of superconducting materials.
20. What are the properties of paramagnetic materials?
21. How does Bardeen Cooper and Schrieffer theory account for superconductivity?
22. Write a note on permanent and temporary magnets.

(P.T.O.)

PART – C

Answer any FOUR questions **(4 x 10 = 40 marks)**

23. Compare the temperature dependence of paramagnetic, ferromagnetic and antiferromagnetic substances.
24. Write a detailed account of sol-gel and zone refining methods.
25. Discuss the salient features of Frenkel and Schottky defects.
26. a) Explain the X-ray powder method of analysis. (5)
    b) Write a ntoe on Chevrel phases. (5)
27. a) What is p-n junction? How does this lead to the emission of light in the LEDs? (5)
    b) Explain n and p type semiconductors. (5)
28. What are liquid crystals? Write a note on nematic and smectic type liquid crystals.

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