LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – CHEMISTRY

THIRD SEMESTER – NOVEMBER 2016

CH 3876 - MATERIAL SCIENCE

Date: 09-11-2016
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

Part-A

Answer ALL questions. (10 × 2= 20)

1. Define space lattice and basis.
2. What are Glide planes?
3. Classify neutrons based on their energy.
4. Define the two types of gel.
5. Define tensile stress of a material.
6. State Curie-Weiss law for ferro and ferrimagnets.
7. Define GMR effect. Mention any one application.
8. Mention the salient features of BCS theory.
9. Why NiTi alloy is superior in bio medical applications?
10. Differentiate between optical up and optical down conversion with a suitable example.

Part-B

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

11. How are the miller indices of a crystal plane obtained?
12. Define screw axis and discuss the types of screw axis.
13. Derive Bragg's law in crystal structure analysis.
14. Explain the Vickers micro hardness method.
15. Elaborate Czochralski method of crystal growth.
16. Discuss the atomic model of elastic behavior.
17. Mention any five differences between hard and soft magnets.
18. How are nanomaterials useful in the environmental remediation? Explain.
19. What are liquid crystals? Explain the types of liquid crystals with examples.
20. Distinguish between piezo and pyroelectric materials with suitable examples.
21. Mention any five differences between hard and soft superconductors.
22. Differentiate between sol-gel and modified sol-gel method of preparation of nanomaterials with an example.

Part-C

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

23. Discuss the Powder X-ray diffraction method and explain the procedure of crystal structure determination.
24. Explain the scanning electron microscopy analysis for surface studies.
25. Describe the plastic deformation by slip mechanism.
26 a. How is a non-spontaneous splitting up of water achieved using Honda cell? Explain with a neat diagram. **(7)**
   b. The saturation magnetic induction of Ni is 0.65 Wb/m^2. If the density of Ni is 8906 kg/m^3 and its atomic weight is 58.7, calculate the magnetic moment of Ni in Bohr magneton. **(3)**
27. Explain any four types of polarization processes involved in dielectrics.
28. Write a short note on the following:
    i) Magnetostatic energy   ii) metal deficiency defects
    iii) austenite and martensite   iv) coercivity and retentivity

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