LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2018**

CH 3875 – MATERIAL SCIENCE

Date: 31-10-2018 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

Part-A

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

1. Define space lattice and basis in crystallography.
2. What is screw axis?
3. How is wigner- seitz unit cell obtained?
4. Classify neutrons based on their energy.
5. Define tensile stress of a material.
6. How is Na_xWO_3 prepared?
7. Define GMR effect.
8. Mention any two differences between hard and soft magnets.
9. What is piezoelectric effect?
10. State Meissner effect.

Part-B

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

11. Derive Bragg's law in crystal physics.
12. Explain the steps involved in obtaining the miller indices of a crystal plane.
13. Define glide plane and explain the types of glide plane.
14. Discuss the Bridgeman - Stockbarger method of crystal growth with a suitable diagram.
15. Describe the atomic model of elastic behavior of materials.
16. Explain the Electron charge density maps in crystal structure determination.
17. Write short notes on the one dimensional conduction behavior of tetracyano platinates.
18. Explain the structure of Y-Ba-Cu-oxide.
19. What are type I and type II superconductors?
20. Discuss the differences between ferro and antiferro magnets.
21. What are shape memory alloys? Explain their characteristics.
22. Explain the structure of Na^+ in beta - alumina.

Part-C

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

23. Explain with an example the three dimensional Bravais lattices of crystal system with lattice parameters. Draw unit cell diagrams.
24. Discuss the Powder X-ray diffraction method and explain the procedure for crystal structure determination.
25. Explain Scanning Electron Microscopy to study the structural properties of materials.
26. Explain the photoelectrocatalytic splitting of water using TiO_2.
27. Draw hysteresis loop for ferromagnets and explain.
28. Define non-linear optics. Explain anyone non-linear optics phenomenon in detail.

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