



**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**

**M.Sc. DEGREE EXAMINATION - CHEMISTRY**

**THIRD SEMESTER – NOVEMBER 2013**

**CH 3876 - MATERIAL SCIENCE**

Date : 15/11/2013  
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

**Part-A**

*Answer all questions. Each question carries two marks.*

1. Distinguish between elastic and inelastic behaviour.
2. Write the relation connecting the bulk modulus, Young's modulus and Poisson's ratio.
3. Outline the role of phase transformation during the formation of crystalline matter.
4. Mention the advantages of neutron diffraction.
5. Briefly highlight the importance of single crystals in modern technology.
6. What is pyroelectric fusion?
7. State Curie-Weiss law.
8. Define critical magnetic field.
9. Draw the structure of micelle and inverse micelle.
10. What is the principle of sol-gel method in preparing the nanomaterials?

**Part-B**

*Answer eight questions. Each question carries five marks*

11. What are Miller indices? Give the stepwise procedure for its determination.
12. With a neat diagram, explain the rotating crystal method.
13. Discuss the structure and gelling mechanism of sodium metasilicate.
14. Explain the procedure for measuring the solubility of the crystal salt along with solubility diagram.
15. Discuss the role of grain size and dislocation motion.
16. Highlight the importance of composites in the design.
17. What are stoichiometric defects? Explain.
18. Draw and explain the crystal structure of Y-Ba-Cu oxide.
19. Define superconductivity. Distinguish type I and type II superconductors.
20. Mention any five differences between hard and soft magnets.
21. Discuss the principle and mechanism of photocatalysis using the nano TiO<sub>2</sub>.
22. What are NEMS and MEMS? Explain.

**Part-C**

*Answer four questions. Each question carries ten marks*

23. With necessary diagram, discuss the atomic model of elastic behavior.
24. Explain the melt growth of crystals employing the Bridgman technique and mention the role of crucible, rate of pulling and furnace design.
25. With detailed theory and diagram, outline the procedure for constructing Bravais lattices.
26. Explain the hysteresis process in ferromagnetic materials and explain the phenomena involved.
27. Discuss the various steps involved in the preparation of nanomaterials by LB method.
28. Define photogalvanic effect. Explain any one application using Honda cell.