



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – APRIL 2016

PH 5408 - MATERIALS SCIENCE

(12th Batch Onwards)

Date: 03-05-2016

Dept. No.

Max. : 100 Marks

Time: 01:00-04:00

PART- A

Answer all the questions

10 x 2= 20 marks

1. Mention various levels of structure.
2. Illustrate hydrogen bonding using water molecules.
3. Explain the phenomenon of work hardening.
4. What is meant by super plastic behavior?
5. Distinguish between hard and soft magnetic materials.
6. Draw the structure of Barium Titanate (BaTiO_3).
7. Mention the uses of Piezoelectric materials.
8. Draw the diagrams to illustrate one way and two way shape memory.
9. Distinguish between X-ray and Gamma ray radiographic methods.
10. Briefly explain the thermos electric method of NDT.

PART-B

Answer any four questions

4x 7.5=30 marks

11. Explain the different kinds of stability employing a tilting rectangular block.
12. Derive the equation of state for a rubbery material.
13. Write a note on magnetic material.
14. Highlight the properties of ferrofluids and their biological applications.
15. With neat diagram explain the procedure to detect flaws using ultrasonic method.
16. With block diagram discuss the construction and working of a metallurgical microscope.

PART-C

Answer any four questions

4 x 12.5= 50 marks

17. Draw the plot for interatomic forces and potential energy as a function distance of separation between two atoms and explain the concepts of bond energy, bond type and bond length.
18. Discuss the atomic model of elastic behavior and derive the relation between the three moduli and the Poisson's ratio.
19. Explain the classification of magnetic materials with suitable diagrams and examples.
20. Highlight the essential features of NEMS and MEMS and discuss the materials employed in their fabrication. **(6.5+6)**
21. Draw the block diagram of an Electron microscope and explain its principle, construction and working.
22. Write a note on 1. Magnetic Shape memory alloys (MSMAs) 2. Smart catalyst and 3. Dielectric elastomers **(4.5+4+4).**
