LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **PHYSICS**

FIFTH SEMESTER – NOVEMBER 2017

PH 5408 - MATERIALS SCIENCE

Date: 15-11-2017 Dept. No. Max. : 100 Marks
Time: 09:00-12:00

PART- A

Answer all the questions **10 x 2= 20 marks**

1. With block diagram, indicate the major groups of engineering materials.
2. Mention the different levels of structure.
3. Define Ultimate Tensile Strength (UTS) of a material.
4. State the condition for super plastic behavior.
5. Briefly explain the properties of diamagnetic materials.
6. Draw the diagram to illustrate the various polarization processes.
7. Mention the medical applications of shape memory alloys.
8. Give examples for "moving" smart materials.
9. Draw the block diagram of a Scanning Electron Microscope (SEM).
10. Outline the photoelastic method of NDT.

PART-B

Answer any four questions **4 x 7.5=30 marks**

11. Elucidate the concept of stability and metastability employing a tilting rectangular block.
12. Draw the tensile stress-strain curve and discuss the behavior of a ductile material.
13. With neat diagram, explain the domain structure of a ferromagnetic material.
14. Highlight the importance of MEMS and discuss the materials used for its fabrication.
15. Discuss the different types of radiographic methods of NDT.
16. Explain how the variations in bonding character influence the properties of materials?

PART-C

Answer any four questions **12.5 x 4= 50 marks**

17. Discuss the different stages involved in the formation of Ionic bonding and drive expression for total energy.

18. Explain the limitations of covalent bonded materials, ductile elements and polymers in the designing of structures and how these drawbacks can be overcome by employing composite materials.
19. Draw the structure of Barium titanate crystal and discuss its ferroelectric properties.
20. With neat sketch, explain the Piezoelectric effect and highlight the uses of Piezoelectric materials in various fields.
21. Draw the block diagram of an Electron microscope and discuss the construction, operation and principle of magnetic focusing.
22. Highlight the essential features of rubber-like elasticity and derive the equation of state of rubbery material.

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