LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **NOVEMBER 2016**

PH 5408 – MATERIALS SCIENCE

Date: 11-11-2016 Dept. No. Max. : 100 Marks

Time: 09:00-12:00

PART A

Answer **ALL** questions: 10 x 2 = 20 marks

1. Mention the various levels of structure in materials.
2. Distinguish between the primary and secondary bondings.
3. State the condition for "super plastic behaviour" of materials.
4. Define ultimate tensile strength (UTS) of a material.
5. Mention the unique properties of diamagnetic materials.
6. Draw the structure of barium titanate.
7. Briefly explain the classification of smart materials.
8. Highlight the application areas of NEMS and MEMS.
9. Explain the photoelastic method of NDT.
10. List the different types of radiographic method employed in NDT.

PART B

Answer any **FOUR** questions: 4 x 7.5 = 30 marks

11. Discuss, how the variations in bonding character influence the properties of materials?
12. Outline the essential features of a "Rubbery" material and derive the equation of state.
13. Explain the effects of temperature and frequency on polarization.
14. Highlight the medical applications of shape memory alloys (SMA).
15. With neat sketch, discuss the procedure for NDT employing the ultrasonic method.
16. Explain the fundamentals of dielectric elastomers and highlight their applications.

PART C

Answer any **FOUR** questions: 4 x 12.5 = 50 marks

17. Using a tilting rectangular block, illustrate the concept of stability and meta stability along with the variation in potential energy.
18. With neat diagram, discuss the elastic behaviour of materials based on the atomic model.
19. Define polarization and discuss the mechanism of various types of polarization.
20. Discuss the experimental procedure to develop ferrofluid and explain their applications in different fields.
21. With block diagram, discuss the principle and working of an electron microscope.
22. Write note on
    (a) Ferromagnetism (6)
    (b) Chromic smart materials (6.5)

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