



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – NOVEMBER 2015

PH 5408 - MATERIALS SCIENCE

Date : 13/11/2015
Time : 09:00-12:00

Dept. No.

Max. : 100 Marks

PART- A

Answer all the questions

10 x 2= 20 marks

1. Give examples for organic polymers and ceramic materials.
2. Draw the diagrams to illustrate and bondings.
3. Write the equation for Young's modulus of a composite material.
4. What is meant by ultimate tensile strength (UTS) of the material?
5. Explain how the intrinsic break down takes place in a dielectric material.
6. Highlight the importance of Hysteresis loop.
7. Mention few medical applications of shape memory alloys (SMA).
8. Highlight the unique properties of dielectric elastomers.
9. Briefly explain the photoelastic method of NDT.
10. Draw the block diagram of a ultrasonic flaw detector.

PART-B

Answer any four questions

7.5 x 4=30 marks

11. Discuss how the variations in bonding character influence the properties of materials.
12. Explain the role of modulus as a parameter while designing the instruments/structures.
13. Define polarization and mention various types of polarization.
14. With neat diagram explain the Piezoelectric effect and mention its uses.
15. Explain the different electrical methods of NDT.
16. Discuss different types of chromic materials and highlight their applications.

PART-C

Answer any four questions

12.5 x 4= 50 marks

17. Using a tilting rectangular block illustrate the concept of stability of materials and draw the plot of potential energy vs configuration.
18. Draw the Stress – Strain curve and explain the variations in the elastic/plastic behavior of the material and derive the power relationship.
19. Discuss the essential properties of ferroelectric materials and explain the structure of Barium titanate (BaTiO_3).
20. What are ferrofluids? Explain its synthesis, properties and applications.
21. Mention the differences between a SEM and an Optical microscope. Draw the diagram of a SEM and discuss its working.
22. Explain the essential conditions for performing NDT with radiographic method and discuss different types of radiographic methods for NDT.
