



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PHYSICS

FIFTH SEMESTER – NOVEMBER 2014

PH 5408 / PH 5405 - MATERIALS SCIENCE

Date : 10/11/2014
Time : 09:00-12:00

Dept. No.

Max. : 100 Marks

PART- A

Answer all the questions:

10 x 2= 20 marks

1. What are engineering structures? Give examples.
2. Define primary and secondary bonds
3. List the advantages of composite materials.
4. Distinguish between true strain and engineering strain.
5. Differentiate between electronic and ionic polarization.
6. What is meant by electric flux density? What is its unit?
7. Define resolving power of a microscope.
8. List two advantages of SEM.
9. What are called smart materials?
10. Mention two materials which have been used for MEMS.

PART-B

Answer any four questions:

4 x 7.5=30 marks

11. Elucidate on the stable, unstable and meta stable states with the help of a tilting rectangular block.
12. Discuss the role of module as an important parameter in designing instruments.
13. Write notes on Ferro, Ferri and Antiferro magnetic materials.
14. With a schematic diagram describe how the ultrasonic method is effective in detecting cracks and cavities in a material. What are the advantages of the method?
15. Give an account of piezoelectric materials.
16. Bring out in detail the effects of temperature and frequency of the electric field on the polarization of materials.

PART-C

Answer any four questions:

4 x 12.5= 50 marks

17. a. Explain the classification of engineering materials with suitable examples.
b. Describe the electronic, nuclear and microscopic levels of identifying the structure of the materials.
18. Outline the atomic model of elastic behaviour. Obtain the relation between Young's modulus Y , Rigidity modulus K , bulk modulus G and Poisson's ratio σ .
19. Discuss the behaviour of materials in a magnetic field. Explain why some are dia-magnetic, some others are para-magnetic and others ferro magnetic?
20. Draw a sketch of the scanning electron microscope and discuss its working.
21. What are shape memory alloys (SMA)? Explain the one way and two way memory effect of SMA.
22. Describe the radiography method to determine the flaws in a material. List out its limitation.
