

**LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034**



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

**SIXTH SEMESTER – APRIL 2022**

**16/17/18UPH6MS01 – MATERIALS SCIENCE**

Date: 24-06-2022

Dept. No.

Max. : 100 Marks

Time: 01:00 PM - 04:00 PM

**PART – A**

**Q. No. Answer ALL the questions (10 x 2 = 20 Marks)**

- 1 Mention the various levels of structure in materials.
- 2 Define bond energy and bond length of a molecule.
- 3 Define Poisson's ratio.
- 4 What is thermal conductivity?
- 5 What is dielectric breakdown?
- 6 What are ferroelectric materials?
- 7 What are smart gels?
- 8 Write the medical applications of shape memory alloys.
- 9 Mention any four popular radiographic methods of NDT.
- 10 Define resolving power of a microscope.

**PART – B**

**Answer any FOUR questions (4 x 7.5 = 30 Marks)**

- 11 Explain the various levels in observing the structure of material.
- 12 Discuss briefly on thermal conductivity and thermal expansion of materials.
- 13 With a neat diagram, discuss the formation of domain structure.
- 14 Briefly explain the various types of smart materials.
- 15 Draw a neat diagram of FTIR instrumentation and explain the working.
- 16 Discuss briefly about bond energy, bond type and bond length.

**PART – C**

**Answer any FOUR questions (4 x 12.5 = 50 Marks)**

- 17 Explain in detail, the formation of ionic bond with specific reference to NaCl crystal.
- 18 Discuss the atomic model of elastic behaviour and derive the relation between the three moduli of elasticity and the Poisson's ratio.
- 19 What is polarization? Briefly discuss the types of polarization and explain the effects of temperature and frequency on polarization.  
Highlight the essential features of NEMS and MEMS and discuss the materials employed in their fabrication.
- 20
- 21 Draw the block diagram of a scanning electron microscope (SEM) and explain its principle, construction and working.
- 22 With neat diagram, explain the piezoelectric effect and discuss the applications of piezoelectric materials.

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