



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

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

**FIFTH SEMESTER – APRIL 2018**

**PH 5405/PH 5402 - MATERIAL SCIENCE**

Date: 10-05-2018  
Time: 09:00-12:00

Dept. No.

Max. : 100 Marks

**PART-A**

**Answer ALL questions**

**(10 x 2 = 20)**

1. Define the term Bond energy
2. What are soft magnetic materials? Give examples.
3. Define space lattice and basis.
4. Give two examples for organic polymers and ceramic materials
5. Differentiate between ionic and covalent bonding.
6. State Bragg's law
7. Define Poisson ratio
8. What are elastomers?
9. What are ferroelectric materials?
10. Briefly explain photo-elastic method of NDT.

**PART- B**

**Answer any Four Questions.**

**(4×7.5=30)**

11. Describe the various levels of observation of structure with a tool at different levels.
12. Briefly discuss the role of elastic modulus as an important parameter in design
13. What is a Bravais lattice? Discuss its properties with a neat sketch
14. Draw the structure of Barium Titanate. Explain its ferroelectric properties
15. What are point defects? Explain Schottky and Frenkel defects. Obtain an expression for defect concentration.
16. With a schematic diagram describe how ultrasonic method is effective in detecting cracks and cavities in a material. What are the advantages of the method?

**PART -C**

**Answer any FOUR questions**

**(4×12.5=50)**

17. Discuss the working of powder X-ray diffractometer with necessary diagram along with the experimental procedure to determine the crystal structure.
18. Discuss in detail, the three important steps involved in the formation of ionic bond with reference to NaCl crystal.
19. Discuss in detail, rubber like elasticity and obtain the equation of state.
20. Outline various contributions to polarization and hence obtain an expression for the total polarization of a substance.
21. Draw the sketch of a electron microscope and discuss its working.
22. Discuss the classification of magnetic materials.

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