# LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

FIFTH SEMESTER – **APRIL 2014**

**PH 5405 - MATERIAL SCIENCE**

Date : 09/04/2014 Dept. No. Max. : 100 Marks

Time : 01:00-04:00

**PART-A**

Answer **ALL** the questions (10 x 2 = 20)

1. Define the term chemical bonding
2. State the basic difference between semiconductor and a ceramic material
3. Define the term space lattice
4. What is Burger's vector
5. Define the term Poisson's ratio
6. Give the units of stress and strain
7. Define the term resolving power
8. Calculate the wavelength associated with a ultrasonic wave at a frequency of 30000 Hz.
9. What is dielectric breakdown?
10. What is ionic polarization**?**

**PART B**

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

11. Write a note on levels of structure
12. Give the lattice specifications of 7 crystal systems
13. Outline the concept of rubber like elasticity and explain how this concept is used in design of materials
14. Derive the expression for Half value thickness of a specimen.
15. Explain how the concept of permanent magnetic moments which can arise from sources due to electron spin

**Part C**

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

16. Discuss in detail the characteristics of ionic bonding in crystals
17. Explain how the powder method is used to determine the structure. From a powder camera of diameter 114.4 mm, using an x-ray beam of wavelength 1.5416 Å, the following S values are obtained in mm for a material: 85, 100, 146.5, 180, 232 and 282. Determine the structure and the lattice parameter of the material.
18. With reference to tensile stress-strain curve, explain the elastic properties.
19. Explain in detail scanning electron microscopic method of characterising the surfaces.
20. Identify the various polarization mechanisms available and discuss the effect of frequency on dielectric constant