



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

**M.Sc. DEGREE EXAMINATION – PHYSICS**

**THIRD SEMESTER – APRIL 2014**

**PH 3951/3953 - CRYSTAL PHYSICS**

Date : 10/04/2014

Dept. No.

Max. : 100 Marks

Time : 01:00-04:00

**PART A**

Answer **ALL** the questions

(10 × 2 = 20)

1. State the procedures for inducing nucleation by artificial methods.
2. Briefly explain the role of soluble impurities on nucleation.
3. Draw the structure of Silica gel.
4. Explain temperature gradient method of crystal growth.
5. Draw the experimental setup for Verneuil technique.
6. Distinguish between chemical vapor and physical vapor transport techniques.
7. Mention the uses of atomic absorption spectroscopy.
8. Explain the concept of negative photoconductivity.
9. List the advantages of DTA over TGA.
10. Distinguish between macrohardness and microhardness.

**PART – B**

Answer any **FOUR** questions

(4 × 7.5 = 30)

11. Discuss the fundamentals of nucleation and its types.
12. Explain the method of growing crystals employing the chemical reaction method.
13. With a neat sketch, discuss the experimental procedure for growing crystals by Czochralski technique.
14. Discuss the method for measuring the dielectric constant and dielectric loss of a crystalline sample using a LCR meter.
15. With block diagram, discuss the components and working principle of a differential scanning calorimeter.

**PART – C**

Answer any **FOUR** questions

(4 × 12.5 = 50)

16. What is meant by induction period and explain its importance? Outline the procedure for measuring the induction period employing i) visual observation ii) conductivity and iii) dilatometer methods.
17. Highlight the importance of low temperature solution growth technique. Discuss the experimental parameters that have to be optimized for growing good quality single crystals.

18. With suitable diagram, outline the procedure for growing single crystals by using Bridgman-Stockbarger melt technique.
19. Explain the concept of nonlinear optics and specify the requirements for NLO materials.
20. With neat sketch, discuss the geometry and working of Vickers hardness tester.