LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - **PHYSICS**

THIRD SEMESTER – **NOVEMBER 2013**

PH 3953/3951 - CRYSTAL PHYSICS

Date : 09/11/2013 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

PART - A

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

1. What is meant by desupersaturation?
2. Briefly explain the turbidity method for induction period measurement.
3. Classify the various methods of crystal growth on the basis of phase transition.
4. Mention a few popular solvents for growing crystals.
5. List the merits of zone melting technique.
6. Briefly explain the principle of flux growth.
7. Draw the energy level diagram to explain the various types of optical transitions.
8. Mention the optical effects and applications involving the third order nonlinearity.
9. Distinguish between the Vickers and Knoop hardness testers.
10. Write the formula to calculate the heat of reaction from the DSC thermogram peak.

PART - B

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

11. Explain the procedure for measuring the induction period employing the conductivity and visual observation methods.
12. With neat sketch, outline the experimental procedure for growing crystals by Verneuil technique.
13. With suitable diagram, distinguish the slow cooling approach from the slow evaporation for achieving growth of single crystals.
14. With necessary circuit diagram, discuss the experimental procedure to perform the photoconductivity study of a sample.
15. Draw the block diagram of TG equipment and provide detailed methodology for sample preparation and operation.

PART - C

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

16. a) Highlight the importance of nucleation and discuss the various stages and kinds of nucleation. (7)

    b) Explain the concept of equilibrium stability and metastable state with necessary diagram. (5.5)
17. a) Explain the structure and gelling mechanism of SMS. (5.5)

    b) With neat diagram, outline the procedure for growing crystals via gel medium employing chemical reaction methods. (7)
18. Discuss the procedure for growing crystals by Bridgman method with suitable diagram.
19. Draw the block diagram of a FTIR spectrometer and explain its instrumentation, sample preparation and working.
20. With necessary theory, outline the procedure for determining the dielectric constant and dielectric loss of the crystalline sample.
21.