



LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION - PHYSICS

THIRD SEMESTER – NOVEMBER 2011

PH 3951/4957 - CRYSTAL PHYSICS

Date : 08-11-2011

Dept. No.

Max. : 100 Marks

Time : 9:00 - 12:00

PART – A

Answer **ALL** the questions

(10 X 2 = 20)

1. What is meant by “Desupersaturation”?
2. Explain the phenomenon of nucleation and its classification.
3. Distinguish between the slow cooling and slow evaporation techniques of crystal growth.
4. Draw the apparatus for Complex-Decomplex method.
5. Explain the Zone melting technique.
6. Outline the mechanism of physical vapour deposition for crystal growth.
7. Highlight the importance of AAS in the analysis of a crystal sample.
8. With necessary plots explain the positive and negative photoconducting nature of materials.
9. List the merits of Knoop hardness tester.
10. Distinguish between the static and dynamic methods of hardness testing.

PART – B

Answer any **FOUR** questions

(4 X 7.5 =30)

11. Outline the experimental procedures for measuring the induction period by conductivity and visual observation methods.
12. With neat sketch discuss the different types of chemical reaction methods employed in growing crystals in a gel medium.
13. Discuss the high temperature growth of crystals with Czochralski pulling technique.
14. Explain the concept of non-linear optics with suitable diagrams and examples.
15. Using a block diagram, explain the working of a differential scanning calorimeter(DSC)

PART – C

Answer any **FOUR** questions

(4 X 12.5 =50)

16. With necessary diagrams, discuss the instrumentation, operation and the determination of Vickers hardness number and work hardening coefficient of a crystal.
17. Discuss the fundamentals of UV-visible-NIR spectroscopy and explain the working of a spectrophotometer.
18. Explain the growth of crystals with Bridgman method with suitable diagrams.
19. (a) Mention the merits of low temperature solution growth methods.
(b) Discuss the roles of purity, pH, solution preparation, seed selection, morphology, agitation etc in influencing the growth of bulk size crystals.
20. Based on the classical theory of nucleation, derive the expression for various nucleation parameters.
