 LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

THIRD SEMESTER – **NOVEMBER 2012**

# PH 3951 - CRYSTAL PHYSICS

Date : 08/11/2012 Dept. No. Max. : 100 Marks

Time : 9:00 - 12:00

**PART – A**

Answer **ALL** questions: (10x2=20)

1. List a few artificial methods of inducing nucleation.
2. Discuss the role of impurities in modifying the nucleation process.
3. Explain the mechanism of gelling.
4. Draw the apparatus for complex and de-complex method.
5. State the condition for growing crystals via hydrothermal approach.
6. Give examples for crystals grown by PVD.
7. Name a few modern versions of FT-RAMAN spectrometer.
8. Draw the experimental set-up for Kurtz-Perry SHG test.
9. Explain the procedure to determine the work hardening coefficient.
10. Mention the various kinds of polarization observed in a dielectric material.

**PART – B**

Answer any **FOUR** questions: (4x7.5=30)

1. With block diagram, discuss the functioning of a Differential Scanning Calorimeter (DSC).
2. Outline the growth of crystals by Bridgman method.
3. With suitable diagrams, explain the experimental procedure to grow crystals by chemical reaction methods employing the gel medium.
4. Discuss the procedure to determine the induction period by conductivity method.
5. With the block diagram explain the instrumentation and working of a FT-IR spectrometer.

**PART – C**

Answer any **FOUR** questions: (4x12.5=50)

1. Discuss the methodology to determine the various nucleation parameters with relevant theory and graphs.
2. Distinguish between the slow cooling and slow evaporation methods of growing crystals. With neat diagram explain the procedure for growing single crystals by low temperature solution growth along with various conditions to be optimized. (3.5+9)
3. List the advantages of growing crystals by melt method. Discuss the working principle involving the growth of crystal by Czochralski pulling technique. (3.5+9)
4. Explain the concept of photoconductivity. With the help of the circuit diagram discuss the procedure to measure the photoconductivity of a sample. (5+7.5)
5. Discuss the various types of hardness measurements.

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