



**DF-1516**

**M. Sc. (Sem. III) (Physics : Material Science)  
Examination  
March / April - 2016  
PH (M) - 533 : Crystal Growth & Characterization**

Time : 3 Hours]

[Total Marks : 70

**Instructions :**

(1)

नीचे दर्शायेक निशानीवाणी विगतो उत्तरवडी पर अवश्य लपवी. Fillup strictly the details of signs on your answer book.	Seat No. :
Name of the Examination :	<input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/>
<input type="text" value="M. SC. (SEM. III) (PHYSICS : MATERIAL SCIENCE)"/>	<input type="text" value="Student's Signature"/>
Name of the Subject :	
<input type="text" value="PH (M) - 533 : CRYSTAL GROWTH &amp; CHARACT."/>	
Subject Code No. : <input type="text" value="1"/> <input type="text" value="5"/> <input type="text" value="1"/> <input type="text" value="6"/>	Section No. (1, 2,...): <input type="text" value="Nil"/>

- (2) Figures to the extreme right side indicate full marks of questions.  
(3) Symbols have their usual meaning.  
(4) Assume data if required.

**1. Write the Answer ANY TWO of the following (14)**

- a. Classify crystal growth techniques on the basis of phase change. State general theories to explain mechanism of crystal growth.
- b (i) Discuss on crystal growth methods  
(ii) Explain any one theory of crystal growth.
- c. (i) Discuss on production of crystal in world.  
(ii) Define solid phase, write the short note on Spherical Nucleus

**2. Write the Answer ANY TWO of the following (14)**

- a. Discuss on crystal grown by melt Techniques, Which crystals are grown by verneuil flame fusion Techniques?
- b. Describe zone melting technique for crystal growth. Give principle and techniques for multi zone refining methods
- c. Give differences between Bridgman method and Czochralski method for crystal growth? Which method is used for growth of sapphire ( $Al_2O_3$ ) crystal? Why?

**3. Write the Answer ANY TWO of the following (14)**

- a. Define solubility and Super solubility Write the growth parameter of solution method. How to control growth Parameter?
- b. Define gel growth method. Give in brief the procedure for preparation of Silica gel.
- c. Explain Hydrothermal crystal growth method. What are the limitations of flux growth?

**4. Write the Answer ANY TWO of the following (14)**

- a. What is difference between CVD and CVT.? Define Epitaxial growth, write the different types of Epitaxial growth techniques.
- b. Describe the Electro deposition method. Write the application of InP Crystal
- c. (i) Explain Cadmium Selenide (CdSe) crystal grown by Elector deposition Method.  
(ii) Write limitation of vapor growth method.

**5. Write the Answer ANY TWO of the following (14)**

- a. Write the stages of qualitative Analysis. Discuss on qualitative and chemical Analysis for grown crystal.
  - b. Explain X-ray diffraction by powder method for grown crystal. Which parameters are found from IR, SEM, EDAX and XRD Analysis?
  - c. Discuss on the types of Thermal Analysis. How to calculate Activation Energy from Tharmogram?
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