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) Fill up strictly the details of signs on your answer book.  

(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 would.  
      (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 verniciu 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 Czechralski method for crystal growth? Which method is used for growth of sapphire (Al₂O₃) crystal? Why?
3. Write the Answer ANY TWO of the following
   
   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
   
   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. (ii) 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
   
   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?