M.Sc. DEGREE EXAMINATION,NOVEMBER 2018
II Year III Semester
Core Elective-III
CRYSTAL PHYSICS

Time : 3 Hours   **Max.marks :75**

Section A $(10 \times 2 = 20)$ Marks

Answer any **TEN** questions

1. What is a critical nucleus?
2. Distinguish between homogeneous and heterogeneous nucleation.
3. What is supersaturation?
4. State the principle of gel growth.
5. Why do powder X-ray diffractogram of a sample exhibit number of peaks?
6. What do we infer from thermogravimetric analysis?
7. What is a reciprocal lattice?
8. Why do crystals alone diffract X-rays?
9. What is van der Waals bonding?
10. Define bond length.
11. What are the advantages of melt growth?
12. Give any two importance of gel technique.

Section B $(5 \times 5 = 25)$ Marks

Answer any **FIVE** questions

13. Derive the expression for critical free energy of formation of cap shaped nucleus.
14. Discuss the growth of crystals from gel using double diffusion method.
15. Write a note on hardness study.
16. Write a brief note on the softwares for structure determination and visualization.
17. Discuss the formation of ionic bond and give the properties of the ionic solids.
18. Describe temperature gradient method of crystal growth.
19. Describe the principle and construction of UV-vis spectrophotometer.

Section C $(3 \times 10 = 30)$ Marks

Answer any **THREE** questions

20. (a) Derive the Gibbs Thomson equation for vapour. (b) Derive the expression for critical free energy of formation of spherical nucleus.

21. Explain the principle, construction, working and the significance of molecular beam epitaxy.

22. Describe the principle, construction and working of FTIR spectrometer.

23. What are the steps involved in the crystal structure determination? Explain about (a) structure refinement and (b) structure analysis.

24. (a) Discuss about the conformations of rings with emphasis on five membered and six membered rings.
    (b) Write a brief note on packing of molecules.

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