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END OF SEMESTER EXAMINATIONS, NOVEMBER – 2018  
ELECTIVE – II: CRYSTAL GROWTH TECHNIQUES  
SUBJECT CODE : 11P3PH13

MAJOR : M.Sc.(Physics)  
TIME : 3 HOURS

SEMESTER : IV  
MAX. MARKS: 70

**SECTION – A (10 X 1 = 10)**

**Answer ALL the Questions:**

1. The change in \_\_\_\_\_ energy takes place in the process of formation of a cluster in a new phase.  
a) surface                      b) chemical                      c) free                      d) potential
2. \_\_\_\_\_ model treat to the behavior of an array of atoms on the surface of the crystal  
a) Heisenberg                      b) Ising                      c) Einstein                      d) Kossel
3. Ambient temperature reduces the possibility of \_\_\_\_\_ to the growth of the crystal.  
a) thermal shock                      b) size                      c) structure                      d) nucleation
4. Spontaneous nucleation in the \_\_\_\_\_ region of the saturation solution.  
a) stable                      b) metastable                      c) labile                      d) unstable
5. Infrared cut-off filters reflect or block mid-infrared wavelength while passing \_\_\_\_\_ light.  
a) far infrared                      b) ultraviolet                      c) visible                      d) near infrared
6. Define nucleation.
7. How surface roughness is calculated in crystal?
8. What is a chemical gel.
9. What is a crucible?
10. What is the use of FTIR?

**SECTION – B (5 X 4 = 20)**

**Answer ALL the Questions:**

11. a) Explain briefly about Gibb's Thomson equation for vapour.  
[OR]  
b) Describe the formation of spherical nucleus from supersaturation solution.
12. a) Write a note on models of surface roughness.  
[OR]  
b) Discuss the BCF theory of solution growth.
13. a) Derive an expression for supersaturation.  
[OR]  
b) List out the importance of gel technique.
14. a) With neat sketch, explain the Verneuil technique.  
[OR]  
b) Write the limits and advantages of CVD.
15. a) Demonstrate the working principle of FTIR.  
[OR]  
b) Write a note on optical and thermal sensors.

**SECTION – C (5 X 8 = 40)**

**Answer ALL the Questions:**

16. a) Explain in detail how the energy is formed in the cylindrical nucleus.  
[OR]  
b) Describe the cap shaped nucleus and disc shaped nucleus in detail.
17. a) Describe the KSV theory in detail.  
[OR]  
b) Elaborately explain the periodic bond chain theory.
18. a) Discuss in detail about the growth of crystal in the low temperature solution.  
[OR]  
b) Elaborately explain the seed preparation in the crystal growth technique.
19. a) Demonstrate the working principle of Czochralski technique.  
[OR]  
b) Describe the chemical vapour deposition in detail.
20. a) With a neat sketch, explain the working of X – ray spectrograph.  
[OR]  
b) Describe the working principle of differential thermal analysis.

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