

**M.Sc. DEGREE EXAMINATION, May 2015**

**(PHYSICS)**

**(SECOND YEAR)**

**220. SOLID STATE PHYSICS AND MATERIAL SCIENCE**

Time: Three hours

Maximum: 100 marks

**SECTION-A**

**(5×4=20)**

**Answer any FIVE questions**

1. Define the following terms:
  - i) Unit Cell
  - ii) Space Lattice
  - ii) Primitive Cell
  - iv) Bravais's lattices
2. Explain Frenkel cell and Schottky defects.
3. Describe the concept "Cyclotron Resonance".
4. What are called colour centres?
5. How do you distinguish fluorescence and phosphorescence.
6. What are ceramics? Explain the structure of ceramic phases.
7. Explain polymerisation mechanism.
8. Write a short note on Thin films and its applications.

**SECTION-B**

**(5×16=80)**

**Answer any FIVE questions**

9. a) Explain with neat diagram the process of vacancy and interstitial diffusion in solids.  
b) Explain the steady state and non-steady state diffusion in solids.
10. Using neat sketches show Schottky defects and derive an expression for it in equilibrium at any given temperature.
11. Describe the motion of electron in a periodic potential using Kronig –Penny model.
12. a) Explain the origin of energy bands in solids.  
b) What is Hall effect? Derive an expression for Hall voltage and Hall co-efficient and give its applications.
13. a) With neat diagram explain Meissner effect for super conductors.  
b) Derive an expression for flux quantization in super conducting ring.

14. a) Explain in detail with illustrative diagram Excitation, Emission and decay mechanism of a Luminescence process.  
b) Describe Ferro electricity and different types of Ferro electric crystals.
15. a) Describe Visco-elastic deformation of polymers with suitable examples.  
b) Explain the different types of composites and give any one method to prepare composites.
16. Describe any two methods with neat sketches to grow a crystal from melt technique.

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