

18. (a) Describe the principle and working of the Ruby laser.

Or

- (b) Describe the phenomena of photoconductivity.

19. (a) Describe the elementary theory of order.

Or

- (b) If the average energy required to create a vacancy in a metal is 1 eV, calculate the ratio of vacancies in the metal at 1000 and 500 K.

20. (a) Derive the London equations and explain the term coherence length.

Or

- (b) Explain the term critical magnetic field in a superconductor. How does the critical magnetic field vary with temperature in type I and II superconductors.

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M.Sc.(CBCS) DEGREE EXAMINATION, APRIL 2013.

Fourth Semester

Physics

SOLID STATE PHYSICS – II

(For those who joined in July 2008-2011)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

1. What is depolarization fields?
2. What is dipolar polarizability?
3. What is a pyroelectric crystal?
4. What are ferroelectric transitions?
5. What are excitons?
6. What do you mean by stimulated emission?
7. What is lattice vacancy?



8. What is Fick's law?
9. What is superconductivity?
10. What do you understand by Meissner effect?

PART B — (5 × 5 = 25 marks)

Answer ALL questions choosing either (a) or (b).

11. (a) Define the term polarization density. Derive an expression for electronic polarizability in a dielectric.

Or

- (b) Describe the behavior of a polar substance in an alternating electric field and explain and the term dipole relaxation.
12. (a) Discuss antiferroelectricity and give some examples of antiferroelectric crystals.

Or

- (b) Explain the second-order phase transition between the ferro- and the paraelectric state.
13. (a) Explain the weakly bound excitons.

Or

- (b) Explain: color centers and traps.

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14. (a) Explain the three basic mechanisms of diffusion.

Or

- (b) Explain the different effects of interstitial impurity in metals.

15. (a) Discuss high temperature superconductors.

Or

- (b) Explain the BCS theory of superconductivity.

PART C — (5 × 8 = 40 marks)

Answer ALL questions choosing either (a) or (b).

16. (a) Derive the electric field in a spherical cavity in a uniformly polarized medium.

Or

- (b) Give the classical theory of electronic polarizability and mention how it is modified in quantum approach.

17. (a) Describe the based on thermodynamics theory of first-order phase transition of ferro- to paraelectric state.

Or

- (b) Explain: piezoelectricity and ferroelasticity.

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