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# END OF SEMESTER EXAMINATIONS, APRIL / MAY – 2017

CONDENSED MATTER PHYSICS SUBJECT CODE: 09P3PH09

MAJOR: M.Sc (Physics)

SEMESTER : III

TIME : 3 HOURS

MAX. MARKS: 70

## SECTION - A (10 X 1 = 10)

## **Answer the Following:**

1. The Laue pattern obtained shows the fold symmetry.

a) two

b) four

c) eight defect.

2. The Schottky defect is a

a) line

b) edge dislocation

c) plane

3. Resistivity of a semi conductor is a function of

a) color

b) density

c) temperature d) atoms. 4. Type of tunneling by Cooper pairs is responsible for effect.

a) Josephson b) Zeeman

c) Piezoelectric

d) Hall

5. Paramagnetism is depends upon the magnetic moment of

a) charge

b) ions

c) atoms

d) molecules

6. Define unit cell.

7. Define Brillouin zones.

8. Explain zone theory.

9. Explain zero point energy in the quantum mechanics the energy of harmonic oscillator.

10. State adiabatic demagnetization.

## $\underline{SECTION} - \underline{B} (5 \times 4 = 20)$

11. a) Derive the reciprocal lattice to fcc lattice.

### [OR]

b) List the special features of electron diffraction.

12. a) Explain Group and phase velocity.

b) Explain edge and screw dislocation.

13. a) Explain the fabrication of p - n junction.

## [OR]

b) Explain Hall Effect.

14. a) Explain Type – I and Type – II superconductors.

## [OR]

b) Explain the various thermodynamics effects in the superconducting states.

15. a) Explain the origin of domains in ferromagnetic materials.

b) Write a note on Neel temperature (T<sub>N</sub>).

### SECTION - C (5 X 8 = 40)

### **Answer the Following:**

16. a) Write the note on (i) Properties of reciprocal lattice.

(ii) Determination of unit cell dimensions

### [OR]

b) Write Bragg's equation. Explain the rotating crystal method of X-ray diffraction.

17. a) Calculate the elastic strain energy of screw dislocations.

### [OR]

b) Calculate the optical and acoustic branch of the lattice with two atoms per primitive cell.

18. a) Calculate the energy band diagram and the Fermi level of impurity semiconductors.

b) Explain the quantitative treatment of the p-n junction rectifier ie biasing of p-n junction.

19. a) Derive the Debye formula for heat capacities of solids.

## [OR]

b) BCS theory of super conductivity – explain in detail.

20. a) Explain the Langevin classical theory of Paramagnetism.

### [OR]

b) Explain the molecular field theory of Anti - Ferro magnetism. Derive Anti ferromagnetic susceptibility http://www.onlinebu.com above Neel temperature.

Answer the Following:

11. a) Derive the rec

b) List the specia
12. a) Explain Group

b) Explain edge
13. a) Explain the fa