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(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2022-23 ONLY)

SUBJECT CODE 22 PPS 206

REG.NO.

N.G.M.COLLEGE (AUTONOMOUS) : POLLACHI

END-OF-SEMESTER EXAMINATIONS : MAY – 2023

M.Sc.- PHYSICS **MAXIMUM MARKS: 50**

II SEMESTER **TIME : 3 HOURS**

CONDENSED MATTER PHYSICS

SECTION – A **(10 X 1= 10 MARKS)**

ANSWER THE FOLLOWING QUESTIONS. **(K1)**

CHOOSE THE BEST ANSWER.

1. The number of atoms per unit cell of diamond structure is _____.
   a) 2 b) 4 c) 6 d) 8
2. Enthalpy of formation for Cu is _____.
   a) 930 kJ/mol b) 1230 kJ/mol c) 960 kJ/mol d) none of these
3. Quantum free electron theory was developed by _____.
   a) Einstein b) Langevin c) Sommerfeld d) Lorentz
4. The crystal first discovered to be ferroelectric is _____.
   a) NaCl b) KDP c) KCl d) none of these
5. Example for Type II superconductor is _____.
   a) Al b) Zn c) Hg d) Nb

ANSWER THE FOLLOWING IN ONE (OR) TWO SENTENCES **(K2)**

6. What is unit cell?
7. Define thermal conductivity.
8. Define mobility of electrons.
9. State Curie-Wiess law.
10. What is Meissner effect?

SECTION – B **(5 X 3 = 15 MARKS)**

ANSWER EITHER (a) OR (b) IN EACH OF THE FOLLOWING QUESTIONS. **(K3)**

11. a) Describe rotating crystal method of X-ray diffraction

(OR)

b) Explain the geometrical construction of reciprocal lattice.

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12. a) Describe the experimental measurement of dispersion relations.

(OR)

b) What is known as density of States? Arrive an expression for it.

13. a) Explain the theory of electron moving in a 1D potential well.

(OR)

b) What are Brillouin zone? How do you construct it?

14. a) Explain in detail the ferro electric domains

(OR)

b) Describe the Neel theory of antiferromagnetism.

15. a) Explain (i) Isotope effect (ii) flux quantization

(OR)

b) Distinguish between A.C. Josephson effect and D.C.Josephson effect with explanations..

SECTION – C (5 X 5 = 25 MARKS)

ANSWER EITHER (a) OR (b) IN EACH OF THE

FOLLOWING QUESTIONS. (K4/K5)

16. a) Discuss Miller indices and find an expression for separation between lattice planes.

(OR)

b) Describe the hcp structure with an example and calculate its packing fraction,

17. a) Describe the Debye's theory of specific heat of solids and deduce the expression for Debye Temperature..

(OR)

b) Discuss Einstein's theory of specific heat of solids.

18. a) What is Hall effect? Explain the experimental determination of Hall coefficient.

(OR)

b) Discuss the behavior of electron in a periodic potential (Kronig – Penney model)

19. a) Describe Langevin's theory of diamagnetism and deduce the expression for diamagnetic susceptibility.

(OR)

b) Discuss quantum theory of paramagnetism.

20. a) Discuss the electrodynamics in superconductors and derive London equations.

(OR)

b) Explain the following (i) BCS theory of superconductors (ii) High temperature superconductors.

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