(FOR THE CANDIDATES ADMITTED

SUBJECT CODE **21 UPS 615**

DURING THE ACADEMIC YEAR 2021-22 ONLY) REG.NO.

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

END-OF-SEMESTER EXAMINATIONS : MAY – 2024

B.Sc. – PHYSICS **MAXIMUM MARKS: 70**

SEMESTER : VI **TIME : 3 HOURS**

PART – III

SOLID STATE PHYSICS & STATISTICAL MECHANICS

SECTION – A (10 X 1 = 10 MARKS)

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

1. The packing fraction for diamond cubic structure is ………….
   a) 60% b) 56% c) 74% d) 34%

2. What is the nature of bonding in CH_4?
   a) covalent b) ionic c) metallic d) dispersion

4. The unit of thermal conductivity is………………….
   a) $Wm^{-1}K^{-1}$ b) $Jm^{-1}K^{-1}$ c) Ws d) Js

4. Superconductivity was first observed by………………..
   a) Orested b) H.K. Onnes c) Ohm d) Meissner

5. The conditional probability is denoted by……….……..
   a) P(AUB) b) P(A+B) c) P(A.B) d)   P(A/B)

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

6. What is space lattice?

7. Define specific heat capacity of solids

8. Give examples for donor and acceptor impurities. .

9. Define transition temperature.

10. Define thermodynamic probability.

SECTION – B   (5 X 4 = 20 MARKS)

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

11.   a)   Mention the 7 basic crystal systems and explain them.

(OR)

b)   State and explain Bragg's law.

12.   a)   Explain with example the covalent bond in crystals.

(OR)

b)   Explain the concept of interaction of light with ionic crystals.

13.   a)   Explain Hall effect and magneto resistance.

(OR)

b)   Explain the thermal properties of free electron gas.

14.   a)   Give the Weiss molecular theory of ferromagnetism.

(OR)

b)   State and explain Meissner effect

15.   a)   What are the basic postulates of Bose-Einstein statistics ?

(OR)

b)   Obtain the expressions for lifetime of micro and macro states.

SECTION – C   (4 X 10 = 40 MARKS)

ANSWER ANY FOUR OUT OF SIX QUESTIONS.   (K4 (Or) K5)

(16ᵗʰ QUESTION IS COMPULSORY AND ANSWER ANY THREE

QUESTIONS (FROM Qn. No : 17 to 21)

16.   Discuss the Maxwell-Boltzmann distribution law and arrive the relation associated with distribution of sta   pes.

17.   Describe hexagonal close packed (hcp) structure calculate   its packing fraction.

18.   Explain the Einstein's theory of specific heat of solids.

19.   Discuss the band theory for metals, semiconductors and insulators

20.   Give the Langevin's classical theory of diamagnetism.

21.   State the postulates of Fermi-Dirac statistics and derive the equation for Fermi-Dirac distribution law.

ETHICAL PAPER   *****