(FOR THE CANDIDATES ADMITTED DURING THE ACADEMIC YEAR 2020-21 ONLY)

SUBJECT CODE 20 UPS 614

REG.NO.

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

END-OF-SEMESTER EXAMINATIONS : MAY – 2023

B.Sc. – PHYSICS **MAXIMUM MARKS: 70**

VI SEMESTER **TIME : 3 HOURS**

PART - III

CONDENSED MATTER PHYSICS AND STATISTICAL MECHANICS

SECTION – A (10 X 1 = 10 MARKS)

ANSWER THE FOLLOWING QUESTIONS.

MULTIPLE CHOICE QUESTIONS. **(K1)**

1. Example for hydrogen bond structure is _____.

   a) H_2O b) Silicon c) CO_2 d) none of these

2. Which of the following is not a ferro magnetic material?

   a) Fe b) Ni c) Cu d) none of these

3. Superconductivity was first observed by _____.

   a) Orested b) H.K. Onnes c) Ohm d) Meissner

4. The number of phase cells of harmonic oscillator is given by _____.

   a) Ehν b) hν/E c) E/hν d) hE/ν

5. In FD statistics, the internal energy of ideal gas at absolute zero is _____.

   a) zero b) not zero c) infinity d) none of these

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

6. What is space lattice?

7. State Joule's law.

8. Define transition temperature.

9. What is entropy?

10. State Planck's law.

ETHICAL PAPER

(CONTD……..2)

SECTION – B (5 X 4 = 20 MARKS)

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

FOLLOWING QUESTIONS. (K3)

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

(OR)

b) What are known as Bravais lattices? List them with description.

12. a) Define the term "Brillouin Zones". Discuss first and second Brillouin Zones..

(OR)

b) What are paramagnetic materials? List some of properties of paramagnetic materials.

13. a) Write the properties of Type I and Type II super conductors.

(OR)

b) State and explain Meissner effect.

14. a) Explain phase space of a microscopic particle.

(OR)

b) Explain the Doppler broadening of spectral lines.

15. a) Write down the basic postulates of Bose-Einstein statistics

(OR)

b) What is known as Thermionic emission? Write about Richardson-Dushmann equation.

SECTION – C (4 X 10 = 40 MARKS)

ANSWER ANY FOUR QUESTIONS. (K4/K5)

Q. No 16 IS COMPULSARY AND ANSWER ANY THREE QUESTIONS

FROM Q. No 17 - 21

16. Derive the Maxwell – Bolzmann statistical expression from the Maxwell – Boltzmann statistical theory.

17. What are known as Miller indices? Discuss the steps involved in the construction of Miller planes with an example.

18. Give the Langevin's classical theory of diamagnetism and deduce the expression for the diamagnetic susceptibility.

19. Write notes on BCS theory. Show that the magnetic flux through uperconductor is quantized.

20. Derive the expressions for average speed, most probable speed and rms speed from Maxwell – Boltzmann distribution equation.

21. Deduce the expression for Fermi – Dirac distribution law from F – D statistical theory.

ETHICAL PAPER

*****