PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)

MSc DEGREE EXAMINATION DECEMBER 2018
(First Semester)

Branch-PHYSICS

CONDENSED MATTER PHYSICS

Time: Three Hours   **Maximum: 75 Marks**

SECTION-A (10 Marks)
Answer ALL questions
ALL questions carry EQUAL marks   **(1 0 x 1 = 10)**

1   **Identify the packing fraction of FCC structure.**
     (i) 0.74   (ii) 6.54
     (iii) 0.52   (iv) 0.68

2   **Name the element comes under simple cubic system.**
     (i) Nacl   (ii) Ag
     (iii) Fe_3C (iv) CsCl

3   **If the mobility of electrons in a metal increases the resistivity.**
     (i) decreases   (ii) increases
     (iii) remainsconstant   (iv) neutral

4   **Choose most widely used conducting materials are**
     (i) Germanium and silicon   (ii) Copper and aluminium
     (iii) Gold and silver   (iv) Tungsten and platinum

5   **Find the classical value of molar lattice specific heat is**
     (i)   3R./2   (ii) 3Ru
     (iii) Ru   (iv) Rw2

6   **Identify at lower temperature the lattice specific heat varies as**
     (i) T^3 (ii) 1,

     (iii) T   (iv) l_f

7   **The susceptibility of a diamagnetic materials is about**
     (i) 10^5 (ii) 10^7
     (iii) $10'^7$ (iv) $-10'^5$

8   **Indicate the relative permeability of iron is**
     (i) 7000   ' (ii) 100'
     (iii) 700   (iv) 5000

9   **The transition temperature of mercury is**
     (i) IK   (ii) 1.14K
     (iii) 4.12K   (iv) 9.22K K_BT_C

10   **The width of the energy gap of a superconductor is maximum at**
     (i) OK   (ii) 3.5 K_BT_C
     (iii) K_BT_C (iv) 300 K_BT_C

SECTION - B (35 Marks!
Answer ALL Questions
ALL Questions Carry EQUAL Marks (5 x 7 = 3 5)

1 1 a Derive the Bragg's law.

12 a Derive an expression for Claussius - Mossotti relation.

OR

   b Define the following terms :
       (i) forbidden energy gap (ii) valence band

13 a Explain Einstein's theory of lattice heat capacity.

OR

   b Derive an expression for the thermal expansion coefficient including the
       anharmonic contribution to lattice vibrations.

14 a Outline the ferromagnetism.

OR

   b Bring out the Hysteresis loop.

15 a Explain briefly about D.C Josephson's effect.

OR

   b Describe the Meissner effect.

SECTION - C (30 Marks)
Answer any THREE Questions
ALL Questions Carry EQUAL Marks (3 x 10 = 30)

16   Enumerate Brillouin zone in one dimension and two dimension.

17   Discuss the Kroenig - Penny model for the motion of an electron in a
        periodic potential.

18   State Dulog - Petite's law and show how the departure from this law at
        lower temperature has been explained by Einstein's theory.

19   Discuss the Langevin's classical theory of paramagnetism.

20   Derive the London equation and explain the term coherence length.

Z-Z-Z   **END**

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