PHY. 401-21 Roll No. ----------

IV Semester Examination, 2021
Physics
Paper-I
Solid State Physics-II

Time : 3 Hours **Max. Marks : 80**
Min. Marks : 16

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Section-A
(MCQ/Objective types question)

Q.1. Bohrmagneton is
(a) magnetic moment of an electron spin
(b) magnetic moment of a nucleus spin
(c) magnetic moment of an electron orbital motion
(d) none of these

Q.2. At Neel temperature
(a) susceptibility is maximum
(b) susceptibility is minimum
(c) permeability is minimum
(d) permeability is maximum

Q.3. If C is the curie temperature and θ is the paramagnetic temperature. Then the relation relating susceptibility χ with curie constant C and for T is
(a) $\chi = \frac{C}{\theta - T}$
(b) $\chi = \frac{C}{T - \theta}$
(c) $\chi = C(\theta + T)$
(d) $\chi = C(\theta - T)$

Q.4. In antiferromagnetic materials, the susceptibility
(a) increases with increase in temperature
(b) decreases with increase in temperature
(c) is independent of temperature
(d) all are true

Q.5. The induced dipole moment for unit volume is called
(a) Debye's temperature
(b) flux density
(c) electric polarization
(d) none of these

Q.6. Clausius-Mosotti relation is
(a) $\frac{N\alpha}{3\varepsilon_0} = \frac{(\varepsilon_r+1)}{(\varepsilon_r+2)}$
(b) $\frac{N\alpha}{\varepsilon_0} = \frac{(\varepsilon_r-1)}{(\varepsilon_r+2)}$
(c) $\frac{N\alpha}{3\varepsilon_0} = \frac{(\varepsilon_r-1)}{(\varepsilon_r+2)}$
(d) $\frac{N\alpha}{3\varepsilon_0} = \frac{(\varepsilon_r+1)}{(\varepsilon_r-2)}$

Q.7. Plasma frequency is defined by
(a) $4\pi ne^2/m$
(b) $m/4\pi ne^2$
(c) $4\pi ne/m$
(d) $m/4\pi ne$

Q.8.Polaritions is
(a) Phonon-photon transverse wave
(b) Lattice vibration wave
(c) Plasma oscillation wave
(d) None of these

Section-B

(Short answer types question)

Q.1. what is mean by screening and explain electrostatic screening.

OR

Discuss the longitudinal plasma oscillation.

Q.2. Explain depolarization field and local electric field.

OR

Explain Lorentz field and field of dipoles.

Q.3. explain paramagnetic susceptibility of conduction electron.

OR

Discuss the features of paramagnetic materials and diamagnetic materials.

Q.4.What are the differences between ferromagnetic and anti-ferromagnetic.

OR

Explain the difference between "curie temperature" and "Neel temperature".

Section-C

(Long answer types question)

Q.1. what is Plasmon's? What do you mean by mott metal-insulator transition?

OR

What is polaritons? Obtain the LST relation.

Q.2. Explain dielectric constant and different types of polarizability.

OR

Explain piezoelectricity, phase transition and antiferro-electricity in brief.

Q.3. obtain the expression for susceptibility of the paramagnetic substance using classical laws.

OR

Write a note on adiabatic demagnetization.

Q.4. What is magnons ? Obtain the dispersion relation for magnons in ferromagnet.

OR

Explain Neel's model of ferrimagnetism.