RAWAL INSTITUTE OF ENGINEERING AND TECHNOLOGY, FARIDABAD
MODEL QUESTION PAPER
SUBJECT – PHYSICS-II (PHY-102-F)

Time: 3 Hours   *Max Marks: 100*

Note: Attempt five questions in all. First question is compulsory select one question from each section. All questions carry equal marks.

Q.1. a) Define translation vector and co-ordination number.
b) What is Bragg's law? Write down the statement of Bragg's law.
c) The de-Broglie wavelength of an electron is 73 A^0. What is its velocity?
d) What do you understand by Fermi energy?
e) What are the nano material?
f) What is Hall Effect? Explain briefly.
g) What are Brillouin zones?
h) Define photoconductivity.
i) Discuss the domain structure in ferromagnetic material.
j) Why does an atom show magnetic dipole moment?

Section A

Q.2. a) What are miller indices? Draw neat diagram to indicate miller indices of the important planes system in a simple crystal. Show that in a cubic crystal the spacing between constructive parallel of miller indices (h,k,l) is given by   10

$$d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

b) What are Schottky defect and Frankel defect in solid? Derive the expression to show that Schottky defect in ionic crystal depends on temperature.   10

Q.3. a) Explain the group velocity and phase velocity. Derive the expression for group velocity with which a wave group travels.   10

b) What is a Wave function (ψ)? Discuss Schrödinger wave equation. What role these equation play in quantum mechanics? Derive time independent Schrödinger wave equation.   10

Section B

Q.4. a) Derive the expression for electrical conductivity of metals on the basis of Drude Lorentz theory.   5

b) Discuss the phenomenon of thermionic emission in metals. Obtain Richardson Dashmann equation for the emission of current density.   15

Q.5.   What do you mean by Nanotechnology and its applications? Define Quantum size effect. 20

Section C

Q.6.   Explain the Kronig Penny model for the motion of an electron in a periodic potential. Show from E-K graph that how material can be classified into conductor, insulators, and semiconductors.   20

Q.7. a) What are Traps? Discuss a simple model to show the effect of traps on the photoconductivity and give the applications of photoconductivity.   10

b) What are solar cells? Describe the construction, working and applications of solar cell. Draw its characteristics.   10

Section D

Q.8.   Discuss classical theory of paramagnetic and explain the effect of temperature on paramagnetic properties of a material.   20

Q.9.   Give classical theory of paramagnetism and explain curie law and curie Weiss law.   20