1992

PHYSICS-II

Paper–PHY-102-E

Common for all branches

Time allowed : 3 hours]   *[Maximum marks :100*

*Note :Attempt five questions in all selecting at least one
question from each section.*

Section-I

1. (a) What are the Miller Indices ? How they can be
   determined ? Deduce the formula for the
   distance between two adjacent planes of a simple
   cubic lattice.   10

   (b) What is x-ray diffraction ? Derive Bragg's law.
   Discuss Lane method of crystal structure
   determination.   10

2. (a) Discuss in detail the two draw backs of the
   classical mechanics.   05

   (b) Prove that wave packet associated with a moving
   particle travels with the same velocity as that of
   the particle.   05

   (c) Derive time-dependent Schrodinger wave

Section-II

3. (a) Derive Richardson-Dushman equation of thermoionic emission. 15

    (b) What is Fermi-Dirac distribution function ? Plot this function for various temperature including $0°K$. 05

4. (a) Derive Planck's radiation law. 10

    (b) For a simple cubic lattice calculate

    $d_{100} : d_{110} : d_{111}$ and draw the Miller planes designated by (110), (TTT) and (TT0). 10

Section-III

5. (a) What is Hall effect ? Give an elementry theory of Hall effect. Also give applications of Hall effect. 10

    (b) Discuss the motion of electrons in a periodic field of a crystal and show that effective mass of an electron in a crystal is inversely proportional to the second derivative of E-K

6. (a) What is Photoconductivity ? Discuss a simple model of photoconductor. Show that sensitive photoconductor should have long response time.

10

(b) What are solar cells ? Describe in detail the construction, working, characteristics and uses of a solar cell. 10

Section-IV

7. (a) Derive an expression for magnetic susceptibility of a paramagnetic material. 15

(b) Write a short note on ferromagnetic domains.

05

8. (a) Derive the London equations and discuss how its solution explains Meissner effect and flux penetration ? 15

(b) Explain type-I and type-II superconductors.

05