

PHYSICS-II
(PHY-102, June-04)

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

UNIT-I

1. (a) Discuss in details experimental X-ray diffraction methods.
(b) Give elementary ideas of quarks and gluons.
2. (a) 'Space lattice is a mathematical abstract'. Comment.
(b) Discuss the structure of diamond and calculate packing efficiency.
(c) What are hydrogen bonds? Explain and also give examples.

UNIT-II

3. (a) Differentiate between GROUP VELOCITY and PHASE VELOCITY. Prove that phase velocity of a non-relativistic free particle is 50% of the Group Velocity.
(b) Write a short and to the point on Plank's constant.
4. (a) Derive both the time independent and time dependent Schrödinger's wave equations for a non-relativistic free particle.
(b) The wave function of a free particle cannot be normalized. Comment.

UNIT-III

5. (a) Discuss a suitable model which describes the motion of electrons in periodic potentials.
(b) What do you mean by the terms: Effective mass Brillouin Zones?
6. Define Fermi energy and derive an expression for the same. Also explain its variation with temperature.

UNIT-IV

7. (a) What is photoconductivity? Give a simple model of an intrinsic photoconductor and explain the effect of illumination.
(b) What is the effect of traps on photoconductivity? Explain fully.
8. Write short notes on any three.
 - (a) Classical theory of paramagnetism
 - (b) London's Equations
 - (c) Photovoltaics
 - (d) Orbital diamagnetism