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