(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 9611 Roll No. | | | | | | | | | | |

B.Tech.

(SEMESTER-II) THEORY EXAMINATION, 2011-12

ENGINEERING PHYSICS - II

Time : 2 Hours] *[Total Marks : 50*

Note : This question paper contains **three** Sections – **A, B, C**. Section – **A** has one question having **five** parts. Each part is to be answered in **50-75** words. Section – **B** has **one** question having **five** parts. Only **three** parts are to be answered, each in **100 – 200** words. Section – **C** has **five** questions with internal choice. **All** questions are to be answered, each in **300 – 500** words.

SECTION – A

1. Attempt **all** parts of this question. Each part carries **2** marks. **5 × 2 = 10**

   (a) What information do you derive about nature of light from Compton effect experiment ?

   (b) Give the physical significance of wave function ψ in quantum mechanics.

   (c) Describe the origin of diamagnetism.

   (d) Discuss various types of polarizations in a dielectric medium.

   (e) What is Meissner effect ?

SECTION – B

2. Attempt any **three** parts of this question. Each part carries **five** marks. **3 × 5 = 15**

   (a) Determine the transition temperature and critical field at 4.2 K for a given specimen of a superconductor if the critical fields are 1.410×10^5 and 4.205×10^5 amp/m, at 1.41 K and 12.9 K, respectively.

   (b) Calculate the uncertainty in velocity of an electron which is confined to a box of length 10 A^0. Given $m_e = 9.1 \times 10^{-31}$ Kg. and $h = 6.63 \times 10^{-34}$ J-s.

   (c) Earth receives solar energy from the Sun which is 10 Joules per minute per cm^2. What are the amplitude of electric and magnetic fields of radiation ?

(d) Benzene has static dielectric constant 2.28 while water has 81 at 300 K. Find the polarization when the plates of a capacitor are immersed into these liquids at 300 K in the presence of the electric field of 300 V/ cm. $\varepsilon_0 = 8.85 \times 10^{-12}\ C^2\ N^{-1}\ m^{-2}$.

(e) When X-rays of energy 100 KeV strike a target, they are scattered at an angle 30°. Find the energy of recoil electron. $h = 6.63 \times 10^{-34}$ J-s.

SECTION – C

3. Attempt any **one** part of the following : **1 × 5 = 5**

(a) Write down Schrodinger's wave equation for a particle in one dimensional box and solve it to find out the eigen values and eigen function.

(b) Derive Bragg's law of X-ray diffraction in crystals. How can one use this law to obtain crystal structure ?

4. Attempt any **one** part of the following : **1 × 5 = 5**

(a) Derive an expression for the electric field strength on a molecule within a dielectric. Hence, obtain Clausius – Mossotti relation.

(b) Discuss the behaviour of dielectric in a.c. field and derive an expression for the dielectric loss. Draw frequency response curve of dielectric constant and dielectric loss.

5. Attempt any **one** part of the following : **1 × 5 = 5**

(a) Write down Maxwell's equations in a conducting medium and show that electric and magnetic field strength will decrease exponentially with the distance from the surface into the conducting medium.

(b) Write down Maxwell's equation in integral form and convert them into differential form. Give physical significance of each equation. What correction was made by Maxwell to the Ampere's law ?

6. Attempt any **one** part of the following : **1 × 5 = 5**

(a) What do you mean by superconductivity ? Describe the effect of the following on the superconducting properties.

(i) Magnetic field

(ii) Temperature

(iii) Isotopes

(b) What are Type I and Type II superconductors ? Describe, in brief, BCS theory of superconductivity.

7. Attempt any **one** part of the following : $1 \times 5 = 5$

(a) Give Langevin's theory of paramagnetism. How does it account the main characteristic of the paramagnetic materials ?

(b) What do you mean by magnetic hysteresis ? Explain this effect and draw typical hysteresis curves suitable for transformer core and permanent magnet.
