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

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

B. Tech.

(Second Semester) Carry Over Theory Examination, 2011-12

ENGINEERING PHYSICS–II

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

Note : Attempt questions from each Section as per directions.

Section-A

Attempt *all* parts of this question. Write answer of each part in short. Each part carries 2 marks 2×5=10

1. (a) Compare the wavelength of a photon and an electron if the two have same energy.
   (b) What was the Bragg's explanation about formation of Laue's spots in X-rays diffraction?
   (c) Define local field for dielectric materials.
   (d) Write two differences in propagation of an electromagnetic wave in free space and in conducting medium.
   (e) What are classifications of single walled Nanotube.

Section-B

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

2. (a) Calculate the wavelength of an electron that has been accelerated in a particle accelerator through a potential difference of 100 volt.
   (b) X-rays of 1A° are scattered from a carbon block. Find the wavelength of the scattered beam in a direction of 90° with incident radiation, and kinetic energy imparted to the recoiling electron.
   (c) Find the polarization P in a homogeneous and isotropic dielectric material of relative permeability 4, when the electric displacement density $D=2\times10^{-8}\,C/m^2$.
   (d) A quartz crystal of thickness 0.005 m is vibrating in resonant condition. Calculate the fundamental frequency. The Young's modulus and the density of quartz are 7.9×10^{10} Newton/m^2 and 2650 kg/m^3 respectively.

(e) A 1000 Watt monochromatic lamp radiating its power in all directions. Calculate the maximum value of electric field and magnetic field at a distance of 10 m from the lamp.

Section-C

Attempt *all* questions of this Section. Each question carries 5 marks. 5×5=25

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

(a) Derive the de-Broglie wavelength of a particle as function temperature.

(b) Explain Heisenberg's uncertainty principle with example.

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

(a) Derive time independent Schrödinger wave equation for a particle wave and explain the physical significance of wave function.

(b) What do you mean by Compton effect? Explain modified and unmodified radiations.

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

(a) Explain briefly the different types of polarization in dielectrics.

(b) What is hysteresis curve? Show that the area of this curve is equal to the hysteresis loss in each cycle.

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

(a) Explain the concept of displacement current. How it makes the Ampere's law to valid for non-steady state.

(b) Derive and explain Poynting theorem. What do you understand by Poynting vector.

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

(a) What are superconducting materials? Explain their classification as type-I and type-II superconductors.

(b) What is nanotechnology? Give some important application of nanotechnology.

Physical constants :

Speed of light	$c = 3.0\times10^{8}$ m/s
Planck's constant	$h = 6.62\times10^{-34}$ J-s
Mass of electron	$m = 9.1\times10^{-31}$ kg
Permeability	$\mu_0 = 4\pi\times10^{-7}$ H/m
Permittivity	$\varepsilon_0 = 8.854\times10^{-12}$ F/M

