PAPER ID : 9913

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

Roll No.

B. Tech.

(SEM. II) EXAMINATION, 2010

PHYSICS

Time : **3 Hours]** [Total Marks : 100

Note : All questions have to be attempted. Use of Log table is permitted.

1　Attempt any **four** of the following :　20

(a)　Define inertial frame of reference and state the fundamental postulates of special theory of relativity.

(b)　What are coherent sources of light? Is it possible to obtain coherent sources from two separate sources? If not, why?

(c)　Explain the phenomenon of double refraction in a calcite crystal.

(d)　Write down Maxwell's equation and define symbols used.

(e)　Define permeability and magnetic susceptibility. Show that $\mu = \mu_0(1+\chi_m)$.

(f)　Explain Meissner effect in super conductors.

2　Attempt any **four** of the following :　20

(a)　Discus the distribution of energy in the spectrum of a black body radiation.

(b)　An X-ray photon is found to have its wavelength doubled on being scattered through $90°$. Find the wave length of the incident photon.

(c) Two coherent sources of monochromatic light of wave length 6000 A° produce an interference pattern on a screen kept at a distance of 1 metre from them. The distance between two consecutive bright fringes on the screen is 0.05 mm. Find the distance between the two coherent sources.

(d) A 20 cm long tube containing 48 cm³ of sugar solution rotates the plane of polarization by 11°. If the specific rotation is 66°, calculate the mass of sugar in the solution.

(e) A plane transmission grating has 1500 lines per inch. Find the resolving power of the grating in the second order.

(f) Calculate the de-Broglie wave length of neutron having kinetic energy of 1 ev.

Given $h = 6.63 \times 10^{-34}$ Joule-sec $m = 1.67 \times 10^{-27}$ kg.

3. Attempt any two out of three :   20

(a) Obtain the expression for the addition of the relativistic velocities. Show that C is invariant.

(b) Derive the expression for the diameter of the bright ring of order n in Newton's ring experiment immersed in a liquid of refractive index μ.

(c) Explain Heisenberg uncertainty principle. Show that the electrons can not resides in an atomic nuclear.

4. Attempt any two out of three :   20

(a) What is Polarized light? How will you produce and detect plane, elliptically and circulatory polarised light?

(b) Explain the concept of Maxwell's displacement current and show how it lead the modification of Ampere's law.

(c) What are super conductors? Explain the difference between type I and type II superconductors using the Meissner effect.

5. Attempt any two out of three :   20

(a) Derive Schrödinger's time dependent equation. What is the physical significance of the function ψ used in this equation?

(b) What is meant by hysteresis and cycle of magnetisation. Prove that the area of B H cycle denotes the energy dissipated per CC for sample of iron in the form of an anchor ring.

(c) Explain the principle and working of He-Ne laser. How is it superior to a ruby laser ?