MRSPTU ASSIGNMENT-1, 2 COURSE CODE BPHY0-101
COURSE APPLIED PHYSICS

Assignment of first unit

(EM waves and Dielectrics and Quantum Theory)

Course: B.Tech. 1st year

Q1 Show that magnetic monopoles never exist.

Q2 Examine whether the field given by $E = a(xy^2\, i + y^3\, j)$ is conservative.

Q3 Show that vector field $F= (x+2y+az)i+(bx-3y-2)j+(4x+cy+2z)k$ is irrotational.

Q4 Calculate divergence of E if $E = -5i+6j-10k$.

Q5 What is the energy of gamma ray having a wavelength of 1 angstrom?

Q6 Using uncertainty relation, show that electrons are not present in the nucleus.

Q7 An electron is bound by potential which closely approaches an infinite square well of width 2.5×10^{-10} m. calculate the lowest three permissible quantum energies the electron can have.

Q8 Find the probability that a particle trapped in a box L wide can be found between 0.45 L and 0.55 L for the ground and first excited states.

Q9 The wave function of a particle confined to a box of length L is

$$\Psi(x) = \sqrt{\frac{2}{L}} Sin\ \frac{\pi x}{2}$$

in the region $0 < x < L$ and zero everywhere else. Calculate the probability of finding the particle in the region $0 < x < L/2$.

MRSPTU ASSIGNMENT-1, 2 COURSE CODE BPHY0-101
COURSE APPLIED PHYSICS

Assignment of Second unit

(Elements of crystallography and Magnetic materials and Superconductivity)

Course: B.Tech. 1st year

Q1 Calculate the wavelength of X-rays produced when the potential difference is 12400 volts.

Q2 X-rays of wavelength 2×10^{-11} m suffer 1st order reflection from (111) crystal plane at an angle of 45°. What is the interatomic spacing of the crystal?

Q3 For a simple cubic lattice calculate: $d_{100}:d_{110}:d_{111}$.

Q4 Calculate the energy of neutrons that produces first order Bragg's diffraction at 20°, when incident on a plane separated by a distance 2angstrom.

Q5 Why type II superconductors are more important?

Q6 The critical temperature of Nb is 9.15 K. At zero Kelvin the critical field is 0.196 T. Calculate the critical field at 6 K.

Q7 The isotopes of lead of atomic mass 206 and 210 have Tc values 7.193 K and 7.125 K respectively. Calculate the value of isotope effect coefficient.

Q8 Calculate the critical current which can flow through a long thin superconducting wire of diameter 10^{-3}m. Given $H_c = 7.9 \times 10^3$ Amp/m.