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Roll No. ... .

SECOND SEMESTER

B.Tech (All Branches).

MID SEMESTER EXAMINATION

(February- 2014)

AP-113 Applied Physics-II (Group A & B)

Time : 1:30 Hours *Max. Marks : 20*

Note: Answer *All The* questions
Assume suitable missing data, if any.

1.(a). Define Compton effect. Derive an expression for the change in wavelength of photon that is scattered through an angle "ϕ" by a particle of rest mass m_o. **(3 M)**

(b). A proton and a deuteron have same kinetic energy. Which has longer wavelength? **(2 M)**

2. (a). What do you understand by well-behaved wave function. Which of the following wave functions cannot be the solutions of schrodinger equation? Why?

(1). $\Psi = A \sec x$ (2). $\Psi = A \exp(x^2)$ **(3 M)**

(b). If a particle in a one dimensional box is subjected to the conditions

$U(x)=0$ for $0<x<a$

$= \infty$ for $x \leq 0$ and $x \geq a$

then show that the energy of such a particle would be discrete. **(2 M)**

3. (a).Show that an electromagnetic wave moving in free space moves with a velocity equal to light velocity and derive its energy density value in free space. **(3 M)**

(b). If the average distance between sun and earth is 1.5×10^{11} meter, then calculate how much energy that the earth will receive from sun. (Power radiated by sun = 3.8×10^{26} Watt) **(2 M)**

4. (a). If a 4 KW laser beam is focused by a lens into cross-sectional area about 10^{-6} cm^2, then what is the value of average pointing vector and the amplitude of the magnetic field. Assuming LASER as a light source that gives almost perfectly parallel beam of high intensity. **(3 M)**

(b). An electromagnetic wave with average pointing vector 1.08 W/m^2 falls normally on an absorbing mass of 10^{-3} g/cm^2 and of specific heat 0.2 cal/g°C. Calculate the rate at which the temperature of the absorber rises. (Assume that there no heat loss). **(2 M)**