Total No. of Pages:2 Roll No. 244..

SECOND SEMESTER B.Tech (All Branches).

END SEMESTER EXAMINATION (May- 2014)

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

Time :3:00 Hours Max. Marks : 70

Note: Answer any FIVE questions.
Assume suitable missing data, if any.

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1. (a). What do you mean by Compton effect? Deduce expressions for Compton shift and direction of recoiled electron. (6M)

   (b).Explain why pair production cannot takes place in an empty space. (4M)

   (c). A particle is trapped in a box of width 'L'. Calculate the probability for that particle to found between 0.4 L and 0.6 L for the ground and first excited states. (4M)

2. (a). Differentiate between Maxwell-Boltzmann, Fermi-Dirac and Bose-Einstein statistics. (4M)

   (b).Deduce an expression for Fermi Distribution function and discuss energy variation with temperature. (6M)

   (c). The density of silver is 10.5 g/cm^3 and its atomic weight is 108 g/mole. If each atom contributes one electron for conduction, calculate (a) the number of conduction electrons and
   (b) Fermi energy (4M)

3 (a).What is a harmonic oscillator? Deduce expression for energy levels of a harmonic oscillator using Schrodinger's wave quation. (6M)

(b).Deduce Maxwell speed distribution function using Maxwell-Boltzmann distribution law. (4M)

(c).If annihilation of an electron and a positron moving side by side along positive x-axis direction with 0.5 C produces two photons, then calculate energy of each photon. (4M)

4(a).What is a liquid drop model? Deduce an empirical formula for binding energy per nucleon using this model. (8M)

(b). Explain α-decay and energy released Q in nuclear reaction. Deduce an expression for kinetic energy of α-particle released in the decay process. (6M)

5(a).Using Maxwell's equation derive the electromagnetic wave equations for electric and magnetic field in vacuum and show that they move with the speed of light. (6M)

(b) What is displacement current. Distinguish displacement current and conventional current. Deduce an expression for displacement current. (4M)

(c). A parallel plate capacitor of capacity 55 pf is getting charged by a voltage source at a rare 200 V/s. calculate displacement current. (4M)

6.(a). State and explain Poynting theorem. An electric bulb of 500 watt power radiates light in all directions. If earth receives 4cal/min/cm^2 energy from sun, then calculate the magnitudes of electric and magnetic fields received by earth (6M)

(b). A radio station of power 80 KW transmits electromagnetic waves in all directions. At 150 km from the radio station, find the magnitudes of electric and magnetic fields. (4M)

(c). What is skin depth. Calculate skin depth for a metal having conductivity 10^6 $(\Omega m)^{-1}$ in the visible range of frequency 10^{15} hz(assume that $\varepsilon=\varepsilon_o$ and $\mu=\mu_o$). (4M)