5. **(a).** Explain equation of continuity and displacement current. **(7M)**
   (b). Explain α and β decay and find their Q-values. **(7M)**

6. **(a).** Describe about liquid drop model of the nucleus and find Semi Empirical formula for binding energy. **(8M)**
   (b). The ^{238}U nuclide can decay by emitting an α-particle
   $^{238}U \rightarrow {}^{234}Th + \alpha$
   The atomic masses of ^{238}U, ^{234}Th and ^{4}He are 238.0507826 u, 234.0435955 u and 4.0026032 u respectively. Find the disintegration energy and also kinetic energy of the alpha particle assuming the parent ^{234}U nucleus was at rest. **(6M)**

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

SECOND SEMESTER **B.Tech (All Branches).**

END SEMESTER EXAMINATION *(May- 2015)*

AP-113 Applied 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). Distinguish between Maxwell-Boltzmann and Bose-Einstein and Fermi -Dirac distribution statistics with one example of each. Show that at high temperature BE and FD goes to MB statistics. **(6M)**

   (b). Fermi energy of silver is 5.51 eV. What is the average energy of a free electron at 0 K. **(4M)**

   (c). The density of Zinc is 7.13×10^3 Kg/m^3 and its atomic weight is 65.4 Calculate the
   (i) Fermi energy
   (ii) Mean energy at T=0K. **(4M)**

2. (a). Among visible light and γ-rays, which can most easily show Compton effect and why? Derive an expression for Compton shift and wavelength of scattered photon. **(8M)**

   (b). X-rays with wavelength λ=1.00 A$^\circ$ are scattered from a carbon block. The scattered radiations are viewed at right angles to the direction of incident beam. Calculate
   (i) The Compton shift
   (ii) The wavelength of scattered radiation
   (iii) The energy imparted to the recoil electron. **(6M)**

3. (a). Write the Schrodinger's equation for a particle confined in a box with potential energy U=0 inside the box. Solve this equation to obtain Eigen values and Eigen functions. **(7M)**

   (b). Obtain an expression for Fermi-Dirac distribution law and explain the concept of Fermi level and Fermi energy. **(7M)**

4. (a). Using Maxwell's equation derive the electromagnetic wave equations for electric and magnetic field in conducting medium. Comment of the velocity of electromagnetic wave in this medium. **(8M)**

   (b). Cosmic microwave back ground radiation fills all space with an average energy density of 4×10^{-14} J/m^3.
   (i) Find the rms value of the electric field associated with this radiation
   (ii) How far a 7.5 kW radio transmitter emitting uniformly in all directions from the radio station. **(6M)**

g_i $(n_i - \alpha - \beta E)$ $\frac{g_i}{n!(g_i - n_i)!}$

P.T.O.