GOVERNMENT COLLEGE OF ENGINEERING, AMRAVATI

(An Autonomous Institute of Govt. of Maharashtra)

Electronics and Telecommunication Department

Class test II

Sub: ETU 601 Electromagnetic fields

Marks: 15

Date: 12th Feb, 2015

Q1. Define depth of penetration with diagram. Find the skin depth for copper at 1000 MHz and 60 Hz and comment on the result, the conductivity of Cu is $5.8*10^7$ S/m. 4M

Q2. Write note on a) Scalar magnetic potential 4M

b) Vector magnetic potential

Q3. Explain with suitable sketch electric boundary conditions. 3M

Q4. Calculate $\mathbf{H}$ in Cartesian co-ordinate at P(1.5,2,3) caused by a current filament of 24 Amp in the a_z direction on z-axis extending from

a) z = 0 to z=6   b) z=6 to z=∞   c)z=- ∞ to z=∞ 4M

ELECTRONICS AND TELECOMMUNICATION DEPARTMENT

Course Code: ETU601

Date: 08/03/2016

Time: 10.30-11.30 a. m.

Max. Marks: 15

Course: Electromagnetic Fields

Duration: 1Hr

Attempt the following

3

1. Find div D

    (a) $D = (2xyz - y^2)a_x + (x^2z - 2xy)a_y + (x^2y)a_z$ C/m^2 at $P_A(2,3,-1)$

    (b) $D = (2\rho z^2 sin^2\emptyset)a_\rho + (\rho z^2 sin2\emptyset)a_\emptyset + (2\rho^2 z sin^2\emptyset)a_z$ C/m^2 at $P_B(2,110^0,-1)$

    (c) $D = 2rsin\theta cos\emptyset a_r + rcos\theta cos\emptyset a_\theta - rsin\emptyset a_\emptyset$ C/m^2 at $P_C(1.5,30^0,50^0)$

2. Let a uniform surface charge density of $5 nC/m^2$ be present at the $z = 0$ plane, a uniform $\quad$ 3 line charged density of $8 nC/m$ be located at $x = 0, z = 4$ and a point charge of $2\mu C$ be present at $P_A(2,0,0)$. If $V = 0$ at $M(0,0,5)$, find V at $N(1,2,3)$.

3. Let $V = 2xy^2z^3 + 3ln(x^2 + 2y^2 + 3z^2)V$ in free space. Evaluate at point $P(3,2,-1)$: $\quad$ 3

    (a)V; (b)$|V|$; (c) E; (d) $|E|$; (e) a_N; (f) D

4. Current density is given as $J = -10^6z^{1.5}a_z$ A/m^2 in the region $0 \leq \rho \leq 20\mu m$; and 0 $\quad$ 3 elsewhere.

    (a) Find the total current crossing the surface $z = 0.1m$, in the a_z direction

    (b) If the charge velocity is $2 \times 10^6 m/s$ at $z = 0.1m$, find ρ_v

    (c) If the volume charge density at $z = 0.15m$ is -2000 C/m^3, find the charge velocity

5. There is a current filament on z-axis carrying $8mA$ current in the a_z direction, find H at $\quad$ 3 $P(2,3,4)$