Total No. of Questions : 6] SEAT No. :

P4915

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T.E./Insem. - 129
T.E. (E & TC)
ELECTROMAGNETICS AND TRANSMISSION LINES
(2012 Pattern) (Semester - I)

Time : 1 Hour] *[Max. Marks : 30*

Instructions to the candidates :

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Use of logarithmic tables slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.***
4) ***Assume suitable data, if necessary.***

Q1) a) State Coulomb's law and derive an expression for electric field intensity (E) due to uniformly charged sheet. **[6]**

b) An electric dipole located at the origin in free space has moment

$\bar{p} = 3\bar{a}_x - 2\bar{a}_y + \bar{a}_z\, nc_m$

i) Find V at P_A (2, 3, 4)

ii) Find V at r = 2.5m, $\theta = 30^\circ$, $\phi = 40^\circ$. **[4]**

OR

Q2) a) State and prove Divergence theorem. **[5]**

b) State and prove Gauss law. **[5]**

Q3) a) Derive current continuity equation in differential form. **[4]**

b) A metallic sphere of radius 10 cm has surface charge density of 10 nc/m^2. Calculate electric energy stored in the system. **[6]**

OR

Q4) a) Derive an expression for capacitance of parallel plate capacitor. **[5]**

b) Derive the boundary condition for electric field at an interface between conductor and free space. **[5]**

P.T.O.

Q5) a) Using Ampere's circuital law find magnetic field intensity ($\overline{H}$) due to an infinite long straight current carrying conductor. **[5]**

b) Find the components of the magnetic field (Hz) which traversed from medium 1 to 2, Z = 0 plane is the interface having $\mu_{r1} = 2.5$ & $\mu_{r2} = 4$.

Given that $\overline{H} = -30\overline{a}_x + 50\overline{a}_y + 70\overline{a}_z \text{ V/m}$. **[5]**

OR

Q6) a) Derive the boundary condition at an interface between two magnetic medium. **[5]**

b) State and explain the scalar and Vector magnetic potentials. **[5]**