Total No. of Questions :6]

SEAT No. :

P5678

[Total No. of Pages :2

TE/INSEM./OCT.-124

T.E. (E & TC)

ELECTROMAGNETICS

(2015 Pattern) (Semester - I) (304183)

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

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume Suitable data if necessary.***

Q1) a) Derive an expression for electric field intensity $\bar{E}$ at any point P due to infinitely long line charge with density ρ_L c/m. **[6]**

b) State Divergence Theorem. State physical significance of divergence and curl. **[4]**

OR

Q2) a) Derive relation between electric field intensity $\bar{E}$ and electric potential v. **[5]**

b) Given $\bar{D} = Z\rho\cos^2\phi\,\hat{a}_z$ c/m^2. Calculate charge density at $(1, \pi/4, 3)$ and the total charge enclosed by the cylinder of radius 1 m with $-2 \le z \le 2m$. **[5]**

Q3) a) Explain the concept of polarization in dielectrics. Define dielectric strength of material. **[5]**

b) Derive an expression for capacitance of two conducting concentric spheres separated by dielectric with permitting $\in$. **[5]**

OR

P.T.O.

Q4) a) A dielectric free space interface is defined by equation $3x+2y+z=12m$. The origin side of interface has $\in_{r1}=3$ and $\bar{E}_1 = 2\hat{a}_x + 5\hat{a}_z \; v/m$. Find $\bar{E}_2$. **[6]**

b) Derive an expression for energy density in the static electric field. **[4]**

Q5) a) Derive boundary conditions for magnetic field at an interface between two magnetic media having permeability μ_1 and μ_2. Boundary is assumed to be free of current. **[6]**

b) Magnetic vector potential $\bar{A}$ is given by, $\bar{A} = -\rho^2/4 \; \hat{a}_z$ wb/m. Calculate the total magnetic flux crossing the surface $\phi = \pi/2, 1 \le \rho \le 2m, \; 0 \le z \le 5m$. **[4]**

OR

Q6) a) State Ampere's circuital law. Find magnetic field intensity $\bar{H}$ due to an infinitely long straight current carrying conductor. Using Ampere's law. **[6]**

b) State Maxwell's equations for static Electric and magnetic field in both integral and point form. **[4]**

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