Total No. of Questions : 6]

SEAT No. :

P55

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Oct./TE/Insem. - 173
T.E. (Electronics)
ELECTROMAGNETICS AND WAVE PROPAGATION
(2015 Course) (Semester - I) (304203)

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

Instructions to the candidates:

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

Q1) a) State and prove Gauss's law. **[5]**

b) Determine $\overline{D}$ at (4, 0, 3) if there is a point charge -5π MC at (4, 0, 0) and a line charge 3π MC/M along the y-axis. **[5]**

OR

Q2) a) Derive the relation between Electric Field Intensity ($\overline{E}$) and electric potential (V). **[5]**

b) Two point charges $-4\mu c$ and $5\mu c$ are located at (2, –1, 3) and (0, 4, –2) respectively. Find the potential at (1, 0, 1), assuming zero potential at infinity. **[5]**

Q3) a) Derive the expression for the capacitance of parallel plate. **[5]**

b) Define polarization and state the relation between polarization and Electric field intensity. **[5]**

OR

Q4) a) Derive the boundary conditions for dielectric to dielectric interface. **[5]**

b) Find the capacitance of a 20 cm co-axial cable having an inner conductor with 0.0295 inches diameter and an outer conductor with inside diameter of 0.116 inches and a polyethylene dielectric with $\in r = 2.26$. **[5]**

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Q5) a) State and explain Biot-Savart's law. **[5]**

b) Planes Z=0 and Z=4 carry current $\overline{K} = -10\ \overline{ax}$ A/M and $\overline{K} = 10\ \overline{ax}$ A/M, respectively, determine $\overline{H}$ at **[5]**

i) (1, 1, 1)

ii) (0, –3, 10)

OR

Q6) a) Derive the boundary condition at an interface between two magnetic medium. **[6]**

b) Given the magnetic vector potential $\overline{A} = -\rho^2/4\ \overline{az}\ Wb/m$, calculate the total magnetic flux crossing the surface $\phi = \frac{\pi}{2}$, $1 \le \rho \le 2m$, $0 \le z \le 5m$. **[4]**

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