Total No. of Questions : 6]

SEAT No. :

P5026

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T.E. / Insem - 524

T.E. (E&Tc) (Semester - I)

ELECTROMAGNETICS AND TRANSMISSION LINES

(2012 Pattern)

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

Instructions to the candidates:

1) *Answer Q.1, or Q.2, Q.3 or Q.4, Q.5 or Q.6.*
2) *Neat diagram must be drawn wherever necessary.*
3) *Figures to the right side indicate full Marks.*
4) *Assume suitable data if necessary.*

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

b) Find the electric flux density $\bar{D}$ at (3, 4, 5) if a point charge Q = 15nC is located at the origin in the cartesian co-ordinate system. **[5]**

OR

Q2) a) Derive the expression for electirc field intensity $\bar{E}$ due to infinite sheet with uniform sheet charge 'ρ_s'. **[5]**

b) Define and explain divergence of electric flux density. Write equation for Divergence in all co-ordinate systems. **[5]**

Q3) a) Derive the electrostatic boundary condition for electric field at an interface between dielectric and conductor. **[6]**

b) Derive an expression for capacitance of parallel plate capacitor. **[4]**

OR

Q4) a) Derive Poisson's and Laplace's equations. **[5]**

b) The region y < 0 contains material for which $\in_{r1} = 2.5$ while the region y > 0 is characterised by $\in_{r2} = 4$. if $\bar{E}_1 = -20\hat{a}_x + 40\hat{a}_y + 80\hat{a}_z$ V/m. Find

i) E_{N1} ii) $\overline{E_{T1}}$ iii) E_1 iv) θ_1 **[5]**

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Q5) a) Write Maxwell's equations for static fields in point. **[5]**

b) State and prove Biot - Savart's law of magneto - Statics. **[5]**

OR

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

b) Find the magnetic field intensity due to a thin long conductor carrying current of one ampere at a distance of 1 cm from the conductor. **[5]**

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