

Total No. of Questions : 6]

SEAT No. :

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**Oct.-16/TE/Insem.-23**  
**T.E. (E & TC) (Semester - I)**  
**Electromagnetics & Transmission lines**  
**(2012 Pattern)**

*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 side indicate full marks.*
- 4) *Assume Suitable data if necessary.*
- 5) *Use of calculator is allowed.*

- Q1)** a) State & prove gauss law. Also write significance of gaussian surface. [5]  
b) Derive the expression for electric field intensity  $\vec{E}$  due to uniform sheet charge ' $\rho_s$ '. [5]

**OR**

- Q2)** a) State & prove divergence theorem for electrostatic field. [5]  
b) A uniform line charge of  $2 \mu\text{C/m}$  is located on z axis. Find  $\vec{E}$  at point P(1,2,3) if line charge extends from  $-\infty$  to  $\infty$ . [5]
- Q3)** a) Derive the electrostatic boundary conditions for electric field at an interface between conductor & free space. [6]  
b) Derive an expression for capacitance of spherical plate capacitor. [4]

**OR**

- Q4)** a) For a parallel plate capacitor, area of plate  $A = 120 \text{ cm}^2$ , Spacing between plates  $d = 5\text{mm}$  separated by dielectric of  $\epsilon_r = 12$ , connected to 40 volt battery. Find [5]  
i) Capacitance  
ii) E  
iii) D  
iv) Energy stored in capacitor
- b) Write poisson's & Laplace's equations & its significance [5]

*P.T.O.*

- Q5)** a) State & Prove stokes theorem of magnetostatics [4]  
b) Give the  $\vec{H} = \nabla \times \vec{A} / \mu_0$ . Determine the current density. Explain the significance of curl. [6]

**OR**

- Q6)** a) Derive the boundary condition at an interface between two magnetic medium. [6]  
b) State & prove Biot-savart's law of magnetostatics. [4]

