

Total No. of Questions : 6]

SEAT No. :

**P224**

**Oct./BE/Insem. - 540**

[Total No. of Pages : 1

**B.E. (Electrical)**

**ELECTROMAGNETIC FIELDS**

**(2015 Course) (Semester - I) (403144 (B)) (Elective - II)**

*Time : 1 Hour]*

*[Max. Marks : 30*

*Instructions to the candidates:*

- 1) *Attempt 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 logarithmic tables, slide rules, Mollier Charts, electronic pocket calculator and steam tables is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Explain with diagram Cartesian and Circular Cylindrical coordinate system. [6]  
b) Determine the dot product, cross product of vectors  $\vec{P} = 2\hat{a}_x - 6\hat{a}_y + 5\hat{a}_z$   
and  $\vec{Q} = 3\hat{a}_y + \hat{a}_z$ . [4]

OR

- Q2)** a) Derive an expression for divergence of a vector. [6]  
b) Explain with example scalar fields and vector fields. [4]  
**Q3)** a) Derive an expression for  $\vec{E}$  due to infinite line charge with uniform line charge density  $\rho_l$  located on z axis. [6]  
b) State and prove Gauss's law. [4]

OR

- Q4)** a) Using Gauss's law, derive an expression for D and E due to infinite plane sheet of charge with surface charge density  $\rho_s$  C/m<sup>2</sup>. [6]  
b) Determine  $\vec{D}$  at (4, 0, 3) if there is a line charge  $4\pi$  mC/m along the y axis. [4]  
**Q5)** a) Derive an expression for Electric field intensity due to an electric dipole. [6]  
b) Determine  $\vec{E}$  from the potential  $V = \rho z \sin \phi + z^2 \cos^2 \phi + \rho^2$ . [4]

OR

- Q6)** a) Explain Conduction current and convection current. [6]  
b) Derive an expression for spherical capacitor. [4]

