Total No. of Questions : 6]

SEAT No. : ____

P34

[Total No. of Pages : 2

Oct./TE/Insem.-148

T.E. (Electronics and Telecommunication)

ELECTROMAGNETICS

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

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

Instructions to the candidates:

1) ***Answer Q. No. 1 or 2, Q. No. 3 or 4, Q. No. 5 or 6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of electronic pocket calculator is allowed.***
5) ***Assume suitable data, if necessary.***

Q1) a) State Gauss Law. Derive an expression for electric field intensity $\bar{E}$ at point P due to point charge using Gauss Law. **[6]**

b) Derive relationship between electric field intensity and electric potential. **[4]**

OR

Q2) a) Determine total electric field intensity $\bar{E}$ at origin due to following charge distributions present in free space. **[6]**

i) Point charge of 12 nc at (–2, 0, 6).

ii) Uniform surface charge density 0.3 nc/m^2 at z = –2.

b) State physical significance of gradient, divergance and curl. **[4]**

Q3) a) Derive the expression for energy density in static electric field. **[6]**

b) Explain the concept at polarization in dielectrics. **[4]**

OR

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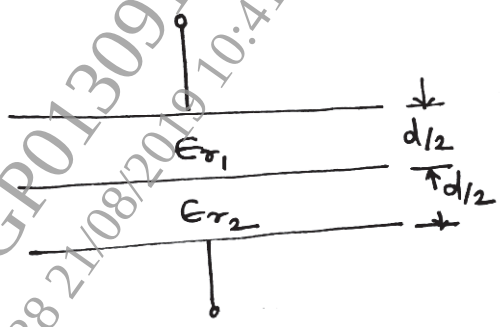
Q4) a) Derive the boundary conditions for static electric field at the interface of dielectric and conductor. **[6]**

b) Determine the capacitance of capacitor as shown in figure, if $E_{r_1} = 4$, $E_{r_2} = 6$ d = 5 mm, S = 30 cm^2. **[4]**



Q5) a) A current element Idi is located in *xy* plane in the form of circular ring. Determine the magnetic field intensity $\overline{4}$ at point (0, 0, h). Consider centre at ring at origin. **[5]**

b) A current distribution gives rise to the vector magnetic potential $\overline{A} = x^2 y \hat{a}_x + y^2 x \hat{a}y - 4xyz \hat{a}_z$ ub/m^2. Calculate - **[5]**

i) $\overline{B}$ at (–1, 2, 5)

ii) The flux through the surface defined by $z = 1,\ 0 \le x \le 1,\ -1 \le y \le 4$.

OR

Q6) a) State and explain Ampere's circuit law. **[4]**

b) The region $x < 0$ is medium 1 with $\mu_{r_1} = 4.5$ and $\overline{H_1} = 4\hat{a}_x + 3\hat{a}_y - 6\hat{a}_z$ A/m. The region $x > 0$ is medium 2 with $\mu_{r_2} = 6$. Find $\overline{H_2}$ in medium 2 and angle made by $\overline{H_2}$ with normal to interface. **[6]**