Total No. of Questions :6]

SEAT No. :

P4217

[Total No. of Pages : 3

[5459]-5
S.E. (E & TC)
ELECTRO MAGNETIC
(2008 Course) (Semester-II)

Time : 2 Hours] *[Max. Marks : 50*

Instructions to the candidates:

1) ***Answer all questions in same answer book.***
2) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6.***
3) ***Figures on the right-side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Neat diagrams must be drawn wherever necessary.***
6) ***Assume suitable data, if necessary.***

Q1) a) A line charge density ρ_l=15n C/m is located in free space on the line y=3, x=4 and a point charge Q=2×10^{-9}C located at the origin. **[8]**

Find:-

i) Electric field Intensity due to the line charge, at P (8, 9, 10).

ii) Electric field intensity due to the point charge, at P (8, 9, 10).

b) Derive the expression for Electric field Intensity $(\vec{E})$ due to an Electric Dipole. **[8]**

OR

Q2) a) State and prove Gauss Law. Explain its applications. **[8]**

b) The Electric field between two concentric cylinders at ρ=0.01m and ρ=0.05m, is given by $\vec{E}=\left(\frac{10^6}{\rho}\right)\overrightarrow{a_\rho}$ V/m. Find the Energy stored in 1 m length. Assume free space & neglect fringing. **[8]**

P.T.O.

Q3) a) For the finite-length current element placed on Z-axis, as shown in figure1 below, find the expression for $\vec{H}$, using Biot-Savart's Law. **[8]**

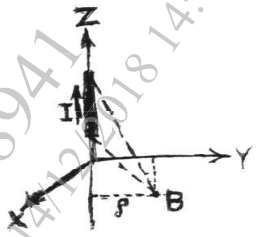

Figure 1

b) Derive the Boundary conditions for an interface between a conductor and dielectric medium. **[8]**

OR

Q4) a) Let $\vec{E} = 18\vec{a}_x - 11\vec{a}_y + 8.5\vec{a}_z$ V/m at a conductor-free-space boundary. Find:- **[8]**

i) Magnitude of $\vec{E}$

ii) Magnitude of E_N

iii) Magnitude of E_T

iv) ρ_s

b) Define the terms scalar magnetic potential, vector magnetic potential and compare scalar magnetic potential with scalar electric potential. **[8]**

Q5) a) State Maxwell's equations for time-varying fields in point form and integral form. Also state the significance of each. **[10]**

b) Write a short note on finite difference Method. **[8]**

OR

Q6) a) A plane electromagnetic wave, travelling in the positive Z-direction, in an unbounded lossless dielectric medium, with $\mu_r = 1$ and $\in_r = 3$, has a peak Electric field Intensity $\vec{E}$ of 16 V/m

Find:-

i) V (Velocity of the wave)

ii) η (characteristic impedance)

iii) $|\vec{H}|$

iv) $|\vec{P}|$ **[10]**

b) Write a short note on finite Element Method. **[8]**

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