[4758] -560

T.E. (Electronics)
ELECTROMAGNETICS & WAVE PROPAGATION
(2012 Course) (End - Sem.)

Time : 3 Hours]   *[Max. Marks : 70*

Instructions to the candidates:
1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, Q.9 or Q.10.*
2) *Neat diagrams must be drawn whenever necessary.*
3) *Figures to the right indicates full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) State & explain Coulomb's law. Write the derivation for Electric Field Intensity. **[4]**

b) Derive continuity equation for current. **[6]**

OR

Q2) a) A region $y \geq 0$ consist of a dielectric medium and the region y <0 is a conductor. For the surface of $4nc/m^2$ on the conductor and $\in r_1 = 3$ (for the dielectric medium). Find $\bar{E}$ and $\bar{D}$ at the points. **[6]**

     i) M (4, –2, 1) &

     ii) N(–3, 1,4)

b) Derive Boundary conditions between conductor & free space. **[4]**

Q3) a) Derive the equation for capacitance of spherical capacitor. **[4]**

b) State Biot- Savart's law. Determine the magnetic field at any point due to a straight filamentary conductor using Biot-Savart's law. **[6]**

OR

Q4) a) Explain the concept of polarization interms of dielectrics. **[4]**

b) State and prove how line integral of flux density can be converted into surface integral. **[6]**

Q5) a) Explain Faraday's law with special case as 'Faraday's Disc generator'.**[8]**

b) What is poynting vector? What is it's significance? Derive an expression for poynting vector P. **[8]**

OR

Q6) a) In a material for which $\sigma = 5.0$ s/m and $\in_r = 1$, the electric field Intensity is E = 250 sin 10^{10} t V/m. Find the conduction and displacement current densities and the frequency at which both have equal magnitudes. **[8]**

b) State & explain Maxwell's equation in Point and Integral form. **[8]**

Q7) a) A plane electromagnetic wave having frequency of 10mHz has an average poynting vector of 1w/m². The medium as lossless with relative permeability of 2 & relative permitivity of '3' find **[8]**

     i) Velocity of propagation

     ii) Wavelength

     iii) Impedance of the medium

     iv) RMS electric field 'E'.

b) Define polarization & explain all types of polarization with expression.**[6]**

c) Explain effects of Earth's magnetic field on wave propagation. **[4]**

OR

Q8) a) Formulate the wave equation from Maxwell's equation. Solve it for perfectly conducting media. **[10]**

b) 'E' & 'H' waves, travelling in free space, are normally incident on the interface with a perfect dielectric with $\mu_r = 1$, $\in_r = 4$. Calculate the transmission & reflection coefficient. Also find E_t & E_r if $E_i = 1.5$ V/m. **[8]**

Q9) a) Explain the fundamental equations for the free space propagation and Friis Transmission equation. **[8]**

b) Explain Ground wave, sky wave & space wave propagation & effects of the earth's curvature on propagation. **[8]**

OR

Q10) a) Explain the characteristics of wireless channel. **[8]**

b) Explain

     i) Multi-hop propagation. **[4]**

     ii) Space-link Geometry. **[4]**

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