Total No. of Questions : 10]

SEAT No. :

P2857

[Total No. of Pages : 3

[4958]-1043

T.E.(Electronics & Telecommunication)

ELECTROMAGNETICS & TRANSMISSION LINES

(2012 Pattern) (Semester-I) (End semester)(304184)

Time :2½Hours] *[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) ***Figures to the right indicate full marks.***
3) ***Neat diagram must be drawn wherever required.***
4) ***Use of Electronic Pocket calculator and smith chart is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) Derive expression for electric field intensity due line charge using Gauss law. **[6]**

b) Derive expression for capacitance of parallel plate capacitance. **[4]**

OR

Q2) a) Derive expression for electric field intensity due sheet charge using Gauss law. **[6]**

b) Explain polarization in dielectrics. **[4]**

Q3) a) Explain the physical significance of Curl. **[4]**

b) Given the potential function V= 4x + 2y V in free space, find the stored energy in 1 m^3 volume centered at the origin. **[6]**

OR

Q4) a) Define conduction current and conduction current density and hence derive current Continuity Equation. **[6]**

b) State and explain Biot and Savart law. **[4]**

Q5) a) Write Maxwell's equations for static and time varying fields in point and integral forms. **[8]**

P.T.O.

b) In the material for which σ =6S/m, $\in_r$ = 2.5. The electric field intensity.

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]**

OR

Q6) a) State and Prove Poynting theorem, Interpret each term. **[8]**

b) A lossy Dielectric has μr=1 εr=1, σ=2×10^{-8} mho/m an electric field $\bar{E}$ =200sin ωt a$_{\bar{z}}$ V/m exist at a certain point in the dielectric

i) At what frequency the conduction current and displacement current densities be equal.

ii) At this frequency calculate the instantaneous displacement current density. **[8]**

Q7) a) State primary and secondary constants of a transmission line and hence derive relationship between primary and secondary constants of transmission line. **[8]**

b) What are the various types of distortions in transmission line, Derive condition for Distortion less line. **[8]**

OR

Q8) a) Explain the phenomenon of reflection on transmission line and reflection coefficient. **[8]**

b) Write the equations for voltage and current at any point along the length of transmission line and hence explain physical significance of general solution of transmission line **[8]**

Q9) a) What do you mean by distortion less line.? Derive the expressions for characteristic impedance and propagation constant for distortion less line. **[8]**

b) A loss less transmission line with characteristic impedance 50 ohm is 30 m long and operates at 2MHz. The line is terminated with a load of (60+j40). If phase velocity is 0.6C where C is speed of light then find.

i) Reflection Coefficient ii) The standing wave ratio

iii) The input impedance **[10]**

OR

Q10) a) Explain what do you understand by standing waves and standing wave voltage ratio and hence derive the expression for input impedance of line in terms of characteristic impedance. **[10]**

b) A transmission line has a characteristic impedance of 300ohm and terminated in a load Z_L = 150+j150Ω. Find the following using smith chart. **[8]**

i) VSWR

ii) Reflection coefficient

iii) Input impedance at a distance 0.1λ from the load

iv) input admittance from 0.1λ from load

◀▶ ◀▶ ◀▶