

Total No. of Questions : 10]

SEAT No. :

P2857

[4958]-1043

[Total No. of Pages : 3

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]**

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- b) In the material for which $\sigma = 6 \text{ S/m}$, $\epsilon_r = 2.5$. The electric field intensity. $E = 250 \sin(10^{10} t) \text{ V/m}$. 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 $\mu_r = 1$, $\epsilon_r = 1$, $\sigma = 2 \times 10^{-8} \text{ mho/m}$ an electric field $\vec{E} = 200 \sin \omega t \text{ a } \vec{z} \text{ V/m}$ exist at a certain point in the dielectric
- At what frequency the conduction current and displacement current densities be equal.
 - 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.
- Reflection Coefficient
 - The standing wave ratio
 - 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 $Z_L = 150 + j150\Omega$. 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

