C   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U3408

B.E./B.Tech. DEGREE EXAMINATION, APRIL 2024

Third Semester

Electronics and Communication Engineering

21UEC308 - ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

(Regulation 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. The product of E and H gives _____ unit   CO1- U

    (a) W/m^2 (b) V/m   (a) W/m^2 (b) V/m

2. For a perfect dielectric, which parameter will be zero?   CO1- U

    (a) Conductivity   (b) Frequency   (c) Permittivity   (d) Permeability

3. Unit of reflection loss is _____   CO1- U

    (a) Neper   (b) Decibel   (c) either (a) or (b)   (d) radians

4. The points of zero voltage or current in the standing waves is   CO1-U

    (a) Antinodes   (b) loops   (c) Nodes   (d) none of the above

5. The velocity with which the energy propagates along a guide is called CO1-U

    (a) Group velocity   (b) Phase velocity   (c) Space velocity   (d) none of these

PART – B (5 x 3= 15 Marks)

6. State faradays law and Lenz law.   CO1- U

7. Write the Maxwell equation for free space.   CO1- U

8. A constant k low pass filter has a cut off frequency of 10 kHZ. The design impedance is 600 ohms. Find the value of L   CO2- App

9. Write the expression for the phase constant and velocity of propagation for telephone cable   CO1-U

10. Write down the expression for the wave impedance for TM,TE and TEM wave.   CO1-U

PART – C (5 x 16= 80Marks)

11. (a) Apply Laplace's equation and derive the expression for the capacitance of a coaxial cable, given boundary values (if b>a V=0 at r=b and V=V0 at r=a).   CO2-App   (16)

Or

(b) Illustrate the Maxwell equation for both integral and point form for time varying field by applying suitable theorem   CO2-App   (16)

12. (a) If electromagnetic waves are propagating in good conductor, analyze the amplitude and phase constants of the wave and justify the reason for amplitude decays exponentially.   CO4-Ana   (16)

Or

(b) Analyze the parameters of EM wave propagation in lossy dielectric and also justify the presence of attenuation constant in EM wave.   CO4-Ana   (16)

13. (a) Derive the expression for Band pass Filter   CO3-App   (16)

Or

(b) Derive the characteristic impedance of T network with Open and short circuit impedance condition   CO3-App   (16)

14. (a) Elaborate single stub matching to measure input and output impedance in detail.   CO1-U   (16)

Or

(b) Describe standing wave ratio for open and short circuited transmission lines.   CO1-U   (16)

15. (a) Compare the field equations for TE waves between parallel planes.   CO1-U   (16)

Or

(b) Determine the solution of electric and magnetic fields of TE waves guided along rectangular waveguide.   CO1-U   (16)