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Question Paper Code: U3408

B.E./B.Tech. DEGREE EXAMINATION, NOV 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. Find the Maxwell equation derived from Faraday's law.   CO1- U

    (a) Div(H) = J   (b) Div(D) = I   (c) Curl(E) = -dB/dt   (d) Curl(B) = -dH/dt

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. Identify the integral form of Ampere's circuital law and Faraday's law for static field.   CO1- U

7. Explain Brewster angle with an example   CO1- U

8. Where are band reject filters used?   CO1- U

9. Derive an expression for open circuited and short circuited transmission line   CO1-U

10. Why rectangular waveguides are preferred over circular waveguide?   CO1-U

PART – C (5 x 16= 80Marks)

11. (a) An Assembly of two concentric spherical shells is considered, the inner spherical shell is at distance of 0.1m and is at potential of 0 V, the outer spherical shell is at distance of 0.2m and is at potential of 100V. The medium is free space .Find Electric field intensity and Electric flux density using spherical coordinates system.   CO2-App   (16)

Or

(b) Derive the expression of Maxwell equation for static and time varying Fields for both electrostatic and magneto static fields by applying suitable theorems.   CO2-App   (16)

12. (a) Analyze the parameters of uniform plane waves propagating in free space medium with the velocity of light by comparing the expression for electric and magnetic field.   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) Design a low pass filter for T and π section having cut off frequency 2 Khz to operative with a terminated load resistance of 500.   CO3-App   (16)

Or

(b) If the π network is open and short circuited with impedance, derive the   characteristic impedance of that network.   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) Illustrate the expression for the field components of TE waves in rectangular waveguide   CO1-U   (16)

Or

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

2

U3408