Reg. No. : | | | | | | | | | | |

Question Paper Code: 45404

B.E. / B.Tech. DEGREE EXAMINATION, MAY 2022

Fifth Semester

Electronics and Communication Engineering

14UEC504 - TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2014)

(Smith chart may be permitted)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Which stands for *dB* relative level?

   (a) *dBrn* (b) *dBa* (c) *dBr* (d) *dBx*

2. One decibel equals to

   (a) 5.356*N* (b) 8.686*N* (c) 7.635*N* (d) None of these

3. A transmission line is terminated in a load equal to its characteristic impedance. The reflection coefficient is

   (a) plus one (b) minus one (c) zero (d) infinity

4. A ____band is the range of frequencies or wavelengths that can pass through a filter without being attenuated.

   (a) Pass (b)Band (c) Base (d) Low

5. Reflection Coefficient K=_____Voltage at load /Incident voltage at the load.

   (a) Reflected (b) Incident (c) Reflection (d) Inflection

6. The distance the wave travels along the line while the phase angle is changing through ____ radians is called a wavelength.

(a) 1 (b) 2 (c) 2.5 (d) 1.5

7. Assumptions for the analysis of the performance of the radio frequency Line, leakage conductance G is

(a) 0.5 (b) 0 (c) 2.5 (d) 1.5

8. Dominant mode means

(a) highest cut-off frequency (b) lowest cut-off wavelength
(c) guide wavelength (d) lowest cut-off frequency

9. Dominant mode in circular cavity resonator is

(a) TM_{010} (b) TM_{111} (c) TM_{101} (d) TM_{100}

10. Principal mode is

(a) TE mode (b) TM mode (c) TEM mode (d) None

PART - B (5 x 2 = 10 Marks)

11. Define Characteristic impedance.

12. List the advantages of double stub matching over single stub matching.

13. Give the dominant mode for TE and TM waves.

14. Define phase velocity.

15. What are the root values for the TE modes?

PART - C (5 x 16 = 80 Marks)

16. (a) (i) Design a T-type prototype band pass filter. (10)

(ii) A constant K T-section high pass filter has a cut-off frequency of 10 kHz. The design impedance is 600 Ω. Determine the value of L. (6)

Or

(b) (i) Derive the current and voltage ratio as exponentials propagation constant. (8)

(ii) Design m derived T type low pass filter to work into load of 500 Ω with cut-off frequency at 4 kHz and peak attenuation at 4.15 kHz. (8)

17. (a) A transmission line has the following primary constants measured per *km*, R =10.15 Ω, L = 3.93 mH, C = 0.00797μF, G = 0.29μmho. Determine Z_0 and propagation constant at a frequency of 796H_z. Also calculate at the sending end if the line is terminated in its characteristic impedance. (16)

Or

(b) Design a single stub match for a load of 150 + j225 ohms for a 75 ohms line at 500 MHz using smith chart. (16)

18. (a) Derive the expression for the field strength for TM waves between Parallel plates propagating in Z direction. (16)

Or

(b) Explain about transverse electromagnetic waves between a pair of perfectly conducting planes. (16)

19. (a) Derive the field component of the wave propagating between parallel planes. (16)

Or

(b) Explain about the excitation modes in rectangular wave guide. (16)

20. (a) Obtain the electromagnetic field equations for TE waves in rectangular waveguides. (16)

Or

(b) What is meant by cavity resonator? Derive the expression for the resonant frequency of the rectangular cavity resonator. (16)

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