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Question Paper Code: 45404

B.E. / B.Tech. DEGREE EXAMINATION, DEC 2021

Fifth Semester

Electronics and Communication Engineering

14UEC504 - TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2014)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

(Smith chart may be permitted)

PART A - (10 x 1 = 10 Marks)

- The circle diagram may be used to find the _____ impedance of a line of any chosen length.
(a) Input (b) Characteristics
(c) Output (d) None of these
- An eighth wave line is used to transform any resistance to an impedance with a magnitude equal to R_0 of the line or to obtain a magnitude match between a resistance of any value and a source of _____ internal resistance.
(a) R_i (b) R_o (c) R_{of} (d) R_{if}
- Condition for distortion less line is
(a) $RG = LC$ (b) $\alpha = \sqrt{RG}$ (c) $LG = RC$ (d) $\beta = \omega\sqrt{LC}$
- 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 $K = \frac{\text{Voltage at load}}{\text{Incident voltage at the load}}$.
- (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. Another name of H wave is
- (a) TM wave (b) TE wave (c) TEM wave (d) Circular wave
8. Dominant mode means
- (a) highest cut-off frequency (b) lowest cut-off wavelength
(c) guide wavelength (d) lowest cut-off frequency
9. Write the Dominant modes of TE waves in rectangular waveguide
- (a) TE_{10} (b) TE_{01} (c) TE_{00} (d) TE_{11}
10. TEM mode sometimes called as
- (a) dominant mode (b) principal mode
(c) degenerative mode (d) parallel mode

PART - B (5 x 2 = 10 Marks)

11. Define propagation constant.
12. Define reflection coefficient.
13. Why is a quarter wave line called as impedance inverter?
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 constant - k low pass filter and derive the expression for phase shift and attenuation. (10)
- (ii) At what frequency will a prototype T-section low pass filter having a cut off frequency f_c , have an attenuation of 10 dB? (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 500Ω with cut-off frequency at 4 kHz and peak attenuation at 4.15 kHz. (8)
17. (a) Derive the expression for the input impedance of the dissipation less line and the expression for the input impedance of a quarter wave line. Also discuss the application of quarter wave line. (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) A lossless transmission line with $Z_0 = 75 \Omega$ and of electrical length $l = 0.3\lambda$ is terminated with load impedance of $Z_R = (40 + j20) \Omega$. Determine the reflection coefficient at load, SWR of line, input impedance of the line. (16)
- Or
- (b) Explain about transverse electromagnetic waves between a pair of perfectly conducting planes. (16)
19. (a) Determine the solution of electric and magnetic fields of TE waves guided along rectangular waveguides. (16)
- Or
- (b) Explain about the excitation modes in rectangular wave guide. (16)
20. (a) Derive the field equation of TM waves in rectangular waveguide. (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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