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Question Paper Code: 45404

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

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)
