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Question Paper Code: 55402

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Fifth Semester

Electronics and Communication Engineering

15UEC502 - TRANSMISSION LINES AND WAVEGUIDES

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

- Relationship between the nepers and decibels are approximately equal to CO1- R
(a) 1neper= 6.686 dB (b) 1neper= 7.686 dB
(c) 1neper= 8.686 dB (d) 1neper= 9.686 dB
- A line of finite length, terminated in a load equivalent to its characteristic impedance, appears to sending end generator as CO2-R
(a) Infinite line (b) Finite line
(c) Finite line with fixed value (d) None of the above
- For a half wave line ,the input impedance is CO3-R
(a) $Z_S = Z_R$ (b) $Z_S > Z_R$ (c) $Z_S < Z_R$ (d) None of the above
- There is no electric field can exist in the direction of the magnetic field such a wave is said to be CO4-R
(a) TE wave (b) TM wave (c) TEM wave (d) Quasi TM wave
- Which is the most dominant mode in rectangular wave guide. CO5-R
(a) TE_{00} (b) TE_{10} (c) TE_{01} (d) TE_{11}

PART – B (5 x 3= 15 Marks)

6. Explain four properties of symmetric networks. CO1- U
7. A 50Ω line is terminated in load $Z_R = 90 + j60 \Omega$. Determine the reflection coefficient. CO2- App
8. Explain nodes and antinodes in Standing Wave Ratio. CO3- U
9. Describe TEM wave. CO4- U
10. A rectangular wave guide with dimensions $a = 8.5\text{cm}$ and $b = 4.3\text{cm}$ is fed by 5 GHz carrier. Will a TE_{11} mode be propagated. CO5- App

PART – C (5 x 16= 80Marks)

11. (a) Design a Low pass filter (both π and T sections) having a cut off frequency of 2 KHz to operate with a terminal load resistance of 500Ω . CO1- App (16)

Or

- (b) Discuss the theory of band elimination filter for both T and π configurations and also plot the variation of reactance with respect to frequency. CO1- U (16)
12. (a) Analyze and obtain the general solution for Transmission line voltage and current. CO2- U (16)

Or

- (b) Describe input impedance of open and short circuited lines, and plot the variation of input impedance of dissipation line as a function of length for open and short line. CO2- U (16)

13. (a) Explain the parameters of the coaxial line at higher frequencies CO3- U (16)

Or

- (b) Illustrate the applications of Smith chart CO3- U (16)
14. (a) (i) Obtain the expression for the EM field components of TM waves between parallel planes propagating in Z direction. CO4- U (12)
- (ii) Discuss the characteristics of TE and TM Waves CO4- U (4)

Or

- (b) Explain the characteristics of TEM waves. Derive its propagation parameters CO4- U (16)
15. (a) (i) An air filled rectangular wave guide has a cross sectional dimension of $x= 8\text{cm}$ and $y=4\text{cm}$. Find the cut off frequency for the following modes TE_{10} and TE_{11} . CO5- App (8)
- (ii) Analyse and obtain the field equations for TE waves in rectangular wave guide for TE_{10} mode. CO5- U (8)
- Or
- (b) (i) Describe cavity resonator. CO5- U (8)
- ii) Deduce the expression for resonant frequency of the rectangular cavity resonator for any given mode. CO5- U (8)

