Register Number:……..

KUMARAGURU college of technology
character is life

B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Fourth Semester

ELECTRONICS AND COMMUNICATION ENGINEERING

U18ECT4104 : Transmission Lines and Waveguides
(Smith Chart to be provided)

COURSE OUTCOMES

CO1: Discuss the fundamental concepts of wave propagation in Transmission Lines and Wave Guides

CO2: Analyze the line parameters and various losses in transmission lines.

CO3: Apply smith chart for line parameter and impedance calculations

CO4: Evaluate the characteristics of Parallel plane and Rectangular wave guides

CO5: Evaluate the characteristics of Circular wave guides and Rectangular cavity resonators

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	For a transmission line with propagation constant $\gamma = 0.650 + j\ 2.55$, What is the value of phase velocity at 1 KHz?	CO1	[K_2]
2.	What are the secondary constants of a line? Why the line parameters are called distributed elements?	CO1	[K_1]
3.	A lossless transmission line has the following per unit length parameter L=0.1μH, C=300pF. Calculate the characteristic impedance of the line.	CO2	[K_2]
4.	State the assumptions for the analysis of the performance of the radio frequency line.	CO2	[K_1]
5.	What are the advantages of double stub matching over single stub matching?	CO3	[K_1]
6.	Why short circuited stub is preferred to open circuited stub?	CO3	[K_2]
7.	Recall dominant mode? Give Examples	CO4	[K_1]
8.	State the characteristics of TEM waves.	CO4	[K_1]
9.	Why transmission line resonator is not usually used as microwave resonator?	CO5	[K_2]
10.	An air filled circular waveguide having an inner radius of excited in dominant mode at 10 GHz. Compute the cut-off frequency of the dominant mode at 10 GHz.	CO5	[K_3]

Answer any FIVE Questions:-
PART B (5 x 4 = 20 Marks)
(Answer not more than 80 words)

11.	A transmission line has $Z_0 = 500\angle -12°$ ohm and Z_R=300ohm. Calculate reflection factor and reflection loss.	CO1	[K_3]
12.	The terminating loop of UHF transmission line working at 300MHz is 50+j50Ω. Calculate VSWR and position of voltage minimum nearest to load if characteristic impedance of the line is 50Ω.	CO2	[K_3]
13.	Design a quarter wave transformer to match a load of 200Ω to a surface resistance 500Ω. Operating frequency is 200MHz.	CO3	[K_3]
14.	A pair of perfectly conducting planes are separated by 8 cm in air. For frequency of 5000 MHz with the TM_{10} mode excited with the cut-off frequency of 1.875 GHz, compute the characteristic impedance and attenuation constant for f = 0.95fc.	CO4	[K_3]
15.	A rectangular waveguide measures 3 x 5 cm internally and has 10GHz signal propagated in it. Calculate cut-off wavelength, guided wavelength and wave impedance for TE_{10} mode.	CO4	[K_3]
16.	A lossless air dielectric cylindrical waveguide of inside diameter 10mm, f=1.3f_c. For TM_{01} mode, compute cut-off frequency, guided wavelength and wave impedance.	CO5	[K_3]

Answer any FIVE Questions:-
PART C (5 x 12 = 60 Marks)
(Answer not more than 300 words)

17.	Generalize the solutions of a transmission line starting from its primary constants.	12	CO1	[K_2]
18.	Describe the expressions for input impedance of lossy and lossless transmission line.	12	CO2	[K_2]
19.	Calculate the location and length of a short-circuited stub required to match the line using smith chart for a 300Ω transmission line is connected to a load impedance of 450 – j600Ω.	12	CO3	[K_3]
20.	Solve the field equations that exists in Rectangular Waveguides.	12	CO4	[K_3]
21.	Derive the expression for the transmission of TE waves between parallel perfectly conducting planes for the field components.	12	CO4	[K_3]
22.	Analyze the expression for Q factor of a cavity resonator for TE_{101} mode.	12	CO5	[K_4]

****