Reg. No.												

Question Paper Code	12156

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Sixth Semester

Electronics and Communication Engineering

EC8651 - TRANSMISSION LINES AND RF SYSTEMS

(Smith Chart is permitted)

(Regulations 2017)

Duration: 3 Hours | Max. Marks: 100

PART-A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Find the reflection coefficient of a transmission line having characteristic impedance Zo =300Ω and terminating impedance in Z_R = 300+j400Ω.	*2,K2,CO1*
2.	Define primary constants of transmission line.	*2,K1,CO1*
3.	Define node and antinode.	*2,K1,CO2*
4.	Determine L and C of a lossless transmission line has a characteristic impedance of 300Ω and wavelength of 2.5m operates at 80 MHz frequency.	*2,K2,CO2*
5.	What is the significance of λ/2 line?	*2,K2,CO3*
6.	List the significance of short circuit stubs.	*2,K2,CO3*
7.	What is meant by dominant mode?	*2,K2,CO4*
8.	Differentiate between evanescent and degenerate modes for waveguides.	*2,K1,CO4*
9.	Differentiate between PN junction and Schottky contact.	*2,K2,CO6*
10.	Define the condition of stability circuit design.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	(i)	Estimate the voltage and current at any point in the transmission line with reference to receiving end terminal.	*8,K2,CO1*
		(ii)	A telephone line has R = 6Ω/km,L=2.2mH/km,C=0.005μF/km and G=0.05X10^{-6} mho/km. Determine the Zo and γ at 1KHz.	*5,K3,CO1*
			OR	
	b)	(i)	What are the types of waveform distortion introduced by a transmission line? Derive the conditions for distortion less transmission line.	*6,K2,CO1*
		(ii)	A telephone line has Zo = 776.52-j321.96Ω, $\gamma = 0.0105\angle 66.65^\circ\ \Omega$. Find R, L, G and C.	*7,K3,CO1*

12. a) (i) Derive the expression for the input impedance of dissipation less line and sketch the input impedance at various location of transmission line. *6,K3 ,C02*

(ii) Derive the expression of standing wave ratio and Discuss the relationship with reflection coefficient. *7,K2 ,C02*

OR

b) (i) Demonstrate the VSWR of a RF transmission system with experimental set up. *6,K3,CO2*

(ii) Discuss the various parameters of open wire and coaxial line at radio frequency. *7,K2,CO2*

13. a) (i) Describe of quarter wave length line and its application. *6,K2,CO3*

(ii) Design a quarter wave transformers to match a load of 200 Ω to a source resistance of 500 Ω. The operating frequency is 200 MHz. *7,K3,CO3*

OR

b) A 50 Ω lossless feeder line is to be matched to an antenna with Z_L = (75-j20)Ω at100 MHz using Single Shorted stub. Find the stub length and distance between the antenna and stub using smith chart. *13,K3,CO3*

14. a) Derive the field expression for TM wave propagation in rectangular waveguide stating the necessary assumptions and sketch the field distribution along the waveguide. *13,K2,CO4*

OR

b) Derive the expression for the field strengths for TE wave between a pair of parallel perfectly conducting planes of infinite extent in the Y and Z directions. The plates are separated in the X direction by 'a' meter and sketch the field distribution. *13,K2,CO4*

15. a) (i) Explain the principle and working of RF field effect transistor. *7,K2,CO6*

(ii) Explain briefly about Mixer circuit and its application in RF system design. *6,K2,CO6*

OR

b) (i) Explain different types of RF power amplifiers with neat sketch. *7,K3,CO6*

(ii) Explain the concept of stability and instability Using stability circles. *6 K3,CO6*

PART C (1 × 15 = 15 Marks)

16. a) For a rectangular air-filled copper waveguide with dimension 2 cm X 1cm cross-section and 30cm length is operated at 9 GHz with a dominant mode. Find the (i)cut-off frequency, (ii)guided wavelength, (iii)phase velocity, (iv)characteristic impedance. *15,K3,CO5*

OR

b) Derive the expressions of field components for TE and TM modes in a rectangular waveguide. *15,K3,CO5*