04 JAN 2023-FN

(CoE)

Reg. No.													

Question Paper Code	11555

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV/DEC 2022

Sixth Semester

Electronics and Communication Engineering

EC8651 - TRANSMISSION LINES AND RF SYSTEMS

(Regulations 2017)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define characteristic impedance.	*2,K1,CO1*
2.	State the properties of an infinite line.	*2,K1,CO1*
3.	List the assumptions to analyze the performance of the line at radio frequency.	*2,K1,CO2*
4.	Calculate standing wave ratio and reflection coefficient on a line having characteristic impedance Zo =300Ω and terminating impedance in Z_R = 300+j400Ω.	*2,K2,CO2*
5.	Indicate the applications of a quarter wave line.	*2,K2,CO3*
6.	State why quarter wave line is called as copper insulator.	*2,K1,CO3*
7.	Distinguish between TE and TM waves.	*2,K2,CO5*
8.	Write the relation between group velocity, phase velocity and free space velocity.	*2,K3,CO5*
9.	List some of the active RF components.	*2,K1,CO6*
10.	Identify the key parameters of amplifiers.	*2,K1,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Obtain the general transmission line equation for the Voltage and current at any point on a transmission line.	*13,K1,CO1*
		OR	
	b)	Estimate the (i) input impedance (ii) Transfer impedance (iii) Open and short circuit impedance of a transmission lines.	*13,K2,CO1*
12.	a)	Explain the parameters of open wire and coaxial cable at High frequency.	*13,K1,CO2*
		OR	
	b)	Calculate the input impedance of the dissipation less line, also deduce the input impedance of an open and short circuited dissipation less line.	*13,K3,CO2*

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

13. a) Derive the expression of quarter wave line. How a quarter wave line can be used as impedance matching. List out the different methods of impedance matching. *13,K3,CO3*

OR

b) An antenna with impedance of 40+j30Ω is to be matched to a 100Ω lossless line with a short circuited stub. Determine the following using Smith chart. (i) The required stub admittance (ii) The distance between the stub and antenna (iii) the stub length (iv) the standing wave ratio on each of the system and operating frequency is 500 MHz. *13,K3,CO3*

14. a) A standard air filled rectangular waveguide with dimensions a = 8.5 cm and b = 4.3 cm is fed by a 4 GHz carrier from co-axial cable. Calculate if a TE11 mode will be propagated. If so calculate phase velocity and group velocity. *13,K3,CO5*

OR

b) When the dominant mode is propagated through a waveguide at a frequency of 9 GHz, the wavelength is found to be 4 cm. Determine dimension of the breadth of the guide. The dominant mode is TE10 mode. *13,K3,CO5*

15. a) With reference to RF transistor amplifier, explain the considerations for stability and gain. *13,K3,CO6*

OR

b) (i) Explain the distinct features of high electron mobility transistors. *8,K2,CO6*
(ii) Compare the field effect transistor with the bipolar junction transistor. *5,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Express the field expression for transmission of TM waves between Parallel Planes. *15,K[illegible]O4*

OR

b) Express the field expression for TE wave propagation in rectangular waveguide stating the necessary assumptions. *15,K2,CO4*