Reg. No.												

Question Paper Code	12599

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Sixth Semester

Electronics and Communication Engineering

EC8651 - TRANSMISSION LINES AND RF SYSTEMS

Regulations - 2017

(Use of Smith Chart is permitted)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	Define propagation constant.	2	K1	CO1
2.	Find the reflection coefficient of a 50 ohm transmission line when it is terminated by aload of 60+j40 ohm.	2	K2	CO1
3.	What is standing wave ratio?	2	K1	CO2
4.	Write the conditions to be satisfied by a dissipationless line.	2	K2	CO2
5.	Give two applications of smith chart?	2	K1	CO3
6.	What is the use of eighth wave line?	2	K1	CO3
7.	What is degenerate mode in rectangular waveguide?	2	K1	CO4
8.	Calculate the cutoff wavelength of a rectangular waveguide whose inner dimensions are a= 2.3 cm and b=1.03 cm operating at TE10 mode.	2	K2	CO5
9.	List out the types of Power Amplifiers.	2	K1	CO6
10.	What are the advantages of microwave transistors?	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
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)	Explain in detail about the primary constants and secondary constants of a transmission line and bring the relation between them	13	K2	CO1
12.	a)	Calculate the input impedance of the dissipation less line, also deduce the input impedance of an open and short circuited dissipation less line.	13	K2	CO2
		OR			
	b) i)	List out the parameters of open wire and coaxial cable at High frequency.	6	K1	CO2
	ii)	A certain transmission line, working at radio frequencies, has	7	K3	CO2

following constants L = 9 and C = 16 PF/m. The line is terminated in a resistive load of 1000. Calculate the reflection co-efficient and standing wave ratio.

13. a) 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 500 MHz. *13 K3 CO3*

OR

b) 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*

14. a) Express the field expression for TE wave propagation in rectangular waveguide stating the necessary assumptions. *13 K2 CO4*

OR

b) 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*

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

OR

b) Explain with necessary diagrams the various types of mixers and its principle of operation. *13 K2 CO6*

PART - C (1 × 15 = 15 Marks)

16. a) 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 500 MHz. *15 K3 CO3*

OR

b) Describe the impedance matching technique using single stub and obtain the expression for the stub location and stub length. *15 K3 CO3*