Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS APRIL/MAY 2026

Fifth Semester

Electronics and Communication Engineering

EC3551 – TRANSMISSION LINES AND RF SYSTEMS

(Smith Charts must be provided)

Regulations - 2021

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q.No	*Questions*	*BTL*	*CO*	*Marks*
1.	Sketch the equivalent circuit of a unit length of transmission line.	L2	1	2
2.	Distinguish phase distortion with frequency distortion.	L1	1	2
3.	State the relationship between standing wave ratio and magnitude of reflection co efficient.	L2	2	2
4.	Why is quarter wave line called an impedance inverter?	L1	2	2
5.	Write the equation to determine the position of the stub.	L1	3	2
6.	Calculate the standing wave ratio if the reflection co-efficient of a line is 0.3 $\angle$-66°.	L2	3	2
7.	Infer the dominant modes of a rectangular waveguide.	L2	4	2
8.	State the features of TM mode.	L1	4	2
9.	Classify RF field effect transistors based on physical construction	L2	5	2
10.	Interpret the importance of voltage controlled oscillator in RF system.	L1	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Derive the expression for open and short-circuited impedance.	L2	1	8
		ii	Describe about the reflection on a line not terminated with its characteristic impedance.	L2	1	8
			Or			
	b	i	Draw and explain the reflection loss due to mismatch between source and load impedances.	L2	1	8
		ii	Illustrate Z_0 and in terms of primary constants and explain the significance of Characteristic Impedance.	L2	1	8
12.	a	i	A 30m long lossless transmission line with Z_0 = 50Ω operating at 2 MHz is terminated with a load Z_L =60+j40 Ω. If u=0.6c (c is velocity of light, u is phase velocity) on the line, Calculate (i) Reflection Coefficient, (ii) Standing wave ratio (iii) Input impedance.	L2	2	8
		ii	Compute the transmitter end impedance of a HF line having characteristic impedance of 50Ω. The line is of length 1.185 λ and is terminated in a load of 110+j80 Ω.	L2	2	8
			Or			

	b	i	Summarize the effect of the reflection losses on power delivered to the load on an unmatched line.	L2	2	8
		ii	Formulate the expression for maximum and minimum impedances on the lossless line.	L2	2	8
13.	a		For a 50Ω transmission line terminated with a 35+j35Ω inductive load, determine the lengths of two parallel stubs and their respective positions using a Smith chart to achieve impedance matching. The stubs are separated by a distance of $\lambda/4$.	L3	3	16
			Or			
	b		Design a single stub match for a load of 150+j225 Ω for a 75 Ω line at 500 MHz using smith chart.	L3	3	16
14.	a		A rectangular air filled copper waveguide with dimension 0.9inch x 0.4inch cross section and 12 inch length is propagated at 9.2 GHz with a dominant mode. Calculate cutoff frequency, guide wavelength, phase velocity and characteristic impedance.	L3	4	16
			Or			
	b		Calculate the cutoff wavelength, the guided wavelength and the characteristic wave impedance of a circular waveguide whose internal diameter is 4 cm for a 9 GHz signal propagated in the TE11 mode.	L3	4	16
15.	a		Examine the different operating modes of a bipolar junction transistor with appropriate diagram.	L4	5	16
			Or			
	b		Analyze the performance impact of (i) Filters (ii) Couplers (iii) Power Amplifiers and (iv) Low Noise amplifiers in RF Design.	L4	5	16