U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

Programme: B.E. **Semester: VI**
Branch: Electronics and Telecommunication Engineering **Duration: 3 hrs.**
Course Code: 22ET6PCTLA **Max Marks: 100**
Course: Transmission Lines and Antennas

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	*CO*	*PO*	**Marks**
1	a)	Derive the general solution of voltage and current on a transmission line. Explain the significance of characteristic impedance and propagation constant.	*CO2*	*PO1*	**10**
	b)	A transmission line with characteristic impedance Z_0=75 Ω is terminated with a load Z_L = (100+j50) Ω. Find the reflection coefficient, SWR, and input impedance if the line length is 0.3λ.	*CO2*	*PO1*	**10**
		OR			
2	a)	Define a distortionless line. Derive the condition for distortionless transmission on a lossy line.	*CO2*	*PO1*	**10**
	b)	Explain the effect of short- and open-circuit terminations on standing wave formation. Calculate reflection loss and insertion loss for a line with SWR = 3.	*CO2*	*PO1*	**10**
		UNIT - II			
3	a)	Describe how a Smith Chart is used for single-stub matching. Illustrate with an example of matching a Z_L = (80−j40) Ω to a Z_0=50 Ω.	*CO3*	*PO2*	**10**
	b)	A quarter-wave transformer is used to match a 100 Ω load to a 50 Ω line. Find the characteristic impedance of the transformer and input impedance at the junction.	*CO2*	*PO1*	**10**
		OR			
4	a)	Derive the expression for the input impedance of an open-circuited and short-circuited lossless transmission line of length *l*.	*CO3*	*PO2*	**10**
	b)	Using the Smith chart, explain how to locate maximum voltage and minimum current points on a mismatched line.	*CO2*	*PO1*	**10**

			UNIT - III			
	5	a)	Define and explain radiation intensity, directivity, gain, and antenna efficiency.	*CO1*	-	**10**
		b)	Derive the array factor for a broadside linear array of n-isotropic elements with equal amplitude and spacing $\lambda/2$. Sketch for 4 elements.	*CO2*	*PO1*	**10**
			OR			
	6	a)	Explain the principle of pattern multiplication with an example of two isotropic sources spaced λ apart.	*CO1*	-	**10**
		b)	Describe the different field zones of an antenna and their significance in antenna analysis.	*CO2*	*PO1*	**10**
			UNIT - IV			
	7	a)	Derive the radiation resistance of a half-wave dipole antenna.	*CO2*	*PO1*	**10**
		b)	Compare the far-field radiation patterns of a small loop and a short dipole antenna.	*CO2*	*PO1*	**10**
			OR			
	8	a)	Derive expressions for far-field components of a circular loop antenna.	*CO2*	*PO1*	**10**
		b)	Explain the concept of directivity for a circular loop antenna. How is it different from a dipole?	*CO2*	*PO1*	**10**
			UNIT - V			
	9	a)	Discuss Rumsey's Principle. How does it apply to frequency-independent antennas?	*CO2*	*PO1*	**10**
		b)	Explain the working principle of a planar log-spiral antenna. What are its advantages?	*CO1*	-	**10**
			OR			
	10	a)	Compare biconical, bow-tie, and log-periodic antennas in terms of frequency response and applications.	*CO2*	*PO1*	**10**
		b)	What is the significance of using directional biconicals in broadband communication? Describe with a neat sketch.	*CO1*	-	**10**

******