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

Autonomous Institute Affiliated to VTU

February / March 2023 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Electronics & Telecommunication Engineering **Duration: 3 hrs.**

Course Code: 19ET5PCTLA **Max Marks: 100**

Course: Transmission Lines and Antennas **Date: 01.03.2023**

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

1	a)	Derive the expressions for voltage and current equations of a transmission line	**10**
	b)	Prove that RC=LG is the condition for distortionless line.	**06**
	c)	The open and short circuit impedance of a transmission line at 1.6KHz are 900∠-30 and 400∠-10. Calculate the characteristic impedance.	**04**

OR

2	a)	Starting from the expression of voltage and current equation of transmission line, derive the expression for input impedance of a transmission line.	**07**
	b)	Explain waveform distortion in transmission line.	**07**
	c)	Write a short note on: i) Reflection in transmission line ii) Reflection coefficient.	**06**

UNIT - II

3	a)	Starting from the expression of input impedance of transmission line, prove that $Z_0=\sqrt{Zoc\ Zsc}$, $\tanh \gamma l=\sqrt{Zsc/Zoc}$.	**06**
	b)	A transmission line having a characteristic impedance(Z_0) of 50Ω is terminated in an impedance equal to 25-j75. Find the reflection coefficient and standing wave ratio.	**06**
	c)	Explain the application of Smith Chart.	**08**

UNIT - III

4	a)	Explain line parameters R,L,C,G	**05**
	b)	Derive the expression for the inductance of the coaxial line.	**10**
	c)	Write a short note on skin effect.	**05**

UNIT - IV

5	a)	Define the antenna parameters: i) Beam solid angle ii) Radiation Pattern iii) Radiation efficiency.	**06**
	b)	Stating the assumption, Derive Friss transmission formula.	**08**
	c)	Find the directivity of an antenna having radiation resistance of 72Ω and loss resistance of 12Ω, gain of 20.	**06**

OR

6	a)	Derive an array factor expression in case of Linear array of 'N' isotropic point sources of equal amplitude & spacing.	**08**
	b)	Explain power theorem & pattern multiplication.	**06**
	c)	A radio link has a 15W transmitter connected to an antenna of $2.5m^2$ effective aperture at 5GHz the receiving antenna has an effective aperture of $0.5m^2$ & is located at 15km line of sight distance from transmitting antenna Assuming Lossless, matched antennas find the power delivered to the receiver.	**06**

UNIT - V

7	a)	Derive the expression for radiation resistance of a λ /2 diploe.	**07**
	b)	Derive the electric & magnetic field of loop antenna.	**07**
	c)	The radius of a circular loop antenna is 0.02λ. How many turns of the antenna will give a radiation resistance of 35Ω.	**06**

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