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Question Paper Code	11848

B.E. / B.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2023

Sixth Semester

Electronics and Communication Engineering

20ECPC601 – TRANSMISSION LINES AND ANTENNAS

(Regulations 2020)

(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.	Write the expressions for the phase constant and velocity of Propagation for telephone cable.	*2,K2,CO1*
2.	Find the attenuation and phase constant of a wave propagating along the line whose propagation constant is $1.048 \times 10^{-4} \angle 88.8°$.	*2,K2,CO1*
3.	Define Radiation intensity.	*2,K1,CO3*
4.	Given that the radiation resistance of an antenna is 65 ohms and loss resistance is 10 ohms. Calculate its efficiency.	*2,K2,CO3*
5.	Mention the features of the radiation pattern multiplication principle.	*2,K1,CO4*
6.	Illustrate the meaning and need for an antenna array.	*2,K1,CO4*
7.	Write the advantages of offset feed paraboloid reflector.	*2,K1,CO5*
8.	Calculate the power gain of an optimum horn antenna approximately with a square aperture of 10λ on a side.	*2,K2,CO5*
9.	Define (i) skip distance (ii) Critical frequency.	*2,K1,CO6*
10.	Describe the principle of frequency independent antenna.	*2,K2,CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	Derive the general expressions for voltage and current at any point on the radio frequency dissipation less line and draw the incident and reflected voltage wave for the successive instants of time.	*13,K2,CO1*
		OR	
	b)	A transmission line has the following constants R=10.4 Ω, L = 3.66 mH, C= 0.00835 μF and G = 0.08 μ/mhos. If the frequency of operation is 1000 Hz, calculate its characteristics impedance, attenuation, phase constant and phase velocity.	*13,K2,CO1*
12.	a)	Starting from the first principle, derive the expression for the field quantities (E and H) for a half wave dipole. Hence derive the power radiated and the radiation resistance.	*13,K2,CO3*

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

OR

b) Define the following parameters and explain their dependence on an antenna performance (i) Radiation pattern. (ii) Input Impedance (iii) Polarization (iv) Beamwidth (v) Effective aperture (vi) Radiation Power Density. *13,K2,CO3*

13. a) Derive and draw the radiation pattern of an end fire array with 4 isotropic sources of equal amplitude. *13,K2,CO4*

OR

b) Discuss in details the concept, design principles and radiation pattern of Binomial array. *13,K2,CO4*

14. a) With necessary equations, describe the design of a microstrip antenna. Explain the effect of each parameter on the performance of the antenna. *13,K2,CO5*

OR

b) Illustrate the principles of operation of Horn antenna and discuss the various forms of Horn Antenna. Obtain the design equations of Horn Antenna. *13,K2,CO5*

15. a) Design a 50 to 200MHz log periodic dipole antenna for gain corresponds to scale factor 0.8 and space factor 0.15. Assume the gap spacing at the smallest dipole is 3.6mm *13,K2,CO6*

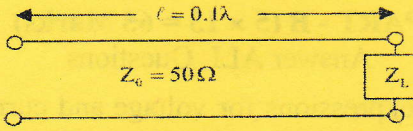
OR

b) Discuss the effects of earth's magnetic field on ionosphere radio wave propagation. *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) (i) Derive the impedance equation for half wave and eighth wave line of transmission line *5,K2,CO2*

(ii) Consider the below representation of transmission line, *10,K2,CO2*



The 0.1 length line shown has a characteristic impedance of 50 and is terminated with a load impedance of Z_L =5+ j25. Find VSWR, Reflection coefficient and input impedance of the line using Smith chart.

OR

b) (i) A line with zero dissipation has R=0.006 Ω/m L=2.5 μH, C=4.45 pF/m. If the line is operated at 10 MHz, find the line constants, velocity of propagation and wavelength. *9,K2,CO2*

(ii) Derive the open and short circuited conditions of dissipation less line with necessary representations. *6,K2,CO2*