Reg. No.												

Question Paper Code	11945

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

Third Semester

M.E. - Communication Systems

20PCOPC301 - MILLIMETER WAVE COMMUNICATION

(Regulations 2020)

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks, K-Level, CO
1.	Define millimeter wave.	*2,K1, CO1*
2.	What are some of the benefits of using mm Wave radio communications?	*2,K1, CO1*
3.	Identify the major advantages to the use of CMOS over other technologies.	*2,K1, CO2*
4.	State consumption factor theory.	*2,K1, CO2*
5.	What is meant by Transceiver without Mixer?	*2,K1, CO3*
6.	What are the Millimeter Wave Calibration Techniques?	*2,K1, CO3*
7.	How to achieve maximum gain in spatial diversity?	*2,K2, CO4*
8.	What are the main parameters affecting the performance of a massive MIMO antenna?	*2,K1, CO4*
9.	What is adaptive antenna array?	*2,K2, CO6*
10.	Write the advantages of adaptive antenna array in mm wave.	*2,K1, CO6*

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

11.	a)	What are the Millimeter wave free space and propagation loss factors? Describe them in detail.	*13,K2,CO1*
		OR	
	b)	Elaborate the challenges of millimeter wave implementation in 5G Networks.	*13,K2,CO1*
12.	a)	How to generate millimeter waves? Explain any two types of generation.	*13,K2,CO2*
		OR	
	b)	Discuss in detail power frequency, current frequency and power gain frequency limitations with respect to a millimeter wave transistor.	*13,K2,CO2*

13. a) (i) Why millimetre wave receiver preferred without local oscillator? *5,K2,CO3*
(ii) Describe On/off keying modulation scheme with block diagram *8,K2,CO3*

OR

b) Calculate transmit EIRP, Free space path loss and signal to noise ratio. Transmitter power = 12 , Transmitter Gain = 38, Transmitter line loss = 0, Operating frequency = 60 GHz, Path length = 0.7 Km, Receiver Gain = 38, Receiver line loss = 0 , Receiver Noise figure= 10 , Band Width = 2000 , Temp (degreeC) = 25, Vapour attenuation = 0 dB/Km, Oxygen attenuation = 14.9 dB/Km, Rain attenuation = 9.175 dB/Km. *13,K3,CO3*

14. a) Write a short note on spatial multiplexing and spatial diversity of antenna arrays. *13,K2,CO4*

OR

b) With the help of a neat block diagram, explain the working of OFDM modulation scheme for millimeter wave communication. *13,K2,CO*

15. a) Explain the operation of i) Antenna on chip ii) Antenna in package using diagrams. *13,K2,CO6*

OR

b) Discuss in detail about the need for beam steering and beam forming. *13,K2,CO6*

PART - C (1 × 15 = 15 Marks)

16. a) Elaborate in detail the spatial multiplexing and spatial diversity of antenna arrays with relevant sketch. *15,K2,CO5*

OR

b) Distinguish temporal and frequency diversity in MIMO system. *15,K2,CO5*