Reg. No.															

Question Paper Code	13003

M.E. / M.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

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.	What are the key benefits of millimeter wave characteristics?	2	K1	CO1
2.	List the propagation effects influencing millimeter wave propagation.	2	K1	CO1
3.	What are the basic configurations of transistors used in millimeter wave radio?	2	K1	CO2
4.	What are the competing trends for future ADCs.	2	K1	CO2
5.	What are the two major categories of digital modulations in MM wave communication?	2	K1	CO3
6.	Illustrate the constellation diagram of 4-QAM.	2	K2	CO3
7.	Define noise coupling in a MIMO system.	2	K1	CO4
8.	How the number of antennas are increased in multiple antennas?	2	K2	CO4
9.	List the various structures in the in-package antenna.	2	K1	CO5
10.	What are the challenges of millimeter wave antennas?	2	K1	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Explain the sliding correlator system to capture small scale and large scale channel data in outdoor environments.	13	K2	CO1
		OR			
	b)	Explain the emerging applications of millimeter wave communications and Ray tracing models for indoor channels.	13	K2	CO1
12.	a)	Describe the key attributes and comparison of millimeter wave power amplifiers and low noise amplifiers.	13	K2	CO2
		OR			
	b) i)	Explain the basic concepts for millimeter wave transistors and devices.	7	K2	CO2
	ii)	Explain the consumption factor for millimeter wave communication systems.	6	K2	CO2

13.	a) i)	Explain transceiver structure without mixer.	*7*	*K2*	*CO3*
	ii)	Infer the millimeter wave design considerations.	*6*	*K2*	*CO3*
		OR			
	b)	Explain FSK signal generators in non-coherent, coherent with constellation and signals in the time domain.	*13*	*K2*	*CO3*
14.	a) i)	Discuss spatial and temporal diversity for millimeter wave system.	*7*	*K2*	*CO4*
	ii)	Summarize the conventional receiver diversity via several antennas.	*6*	*K2*	*CO4*
		OR			
	b)	Explain how MIMO system can be made using a six-port solution with simplified block diagram of a multiport direct conversion transceiver.	*13*	*K2*	*CO4*
15.	a)	Illustrate beam steering for millimeter wave adaptive antenna arrays.	*13*	*K2*	*CO5*
		OR			
	b)	Explain the different antenna topologies for millimeter wave communication applications and various suggestions used for on-chip.	*13*	*K2*	*CO5*

PART - C (1× 15 = 15 Marks)

16.	a) i)	Explain how implementation complexity of OFDM modems can be reduced significantly by employing inverse discrete Fourier transform.	*8*	*K2*	*CO3*
	ii)	Summarize the OFDM communication system with attractive features.	*7*	*K2*	*CO3*
		OR			
	b)	Compare the modulation techniques used in millimeter wave communication, focusing on their bandwidth efficiency and suitability for high data rate applications.	*15*	*K2*	*CO3*