Reg. No.															

Question Paper Code	13722

M.E. - DEGREE EXAMINATIONS, APRIL / MAY 2025

Second Semester

M.E. - Computer Science and Engineering (With Specialization in Networks)

24PCNPC202 - WIRELESS TECHNOLOGIES

Regulations - 2024

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	What is LTE? Mention its features.	2	K1	CO1
2.	Identify the key enabling technologies of 5G.	2	K1	CO1
3.	Name two main hardware components used in mmWave communication systems.	2	K2	CO2
4.	Highlight the difference between MIMO and massive MIMO.	2	K2	CO2
5.	What is multicarrier modulation? Give the purpose of filtering in a multicarrier system.	2	K2	CO3
6.	Specify the two modes of V2X communication defined in 5G.	2	K1	CO3
7.	Outline the distributed cooperative transmission in 5G.	2	K2	CO4
8.	State the purpose of relaying in 5G networks.	2	K2	CO4
9.	Define ultra-reliable low-latency communication and give its application.	2	K1	CO5
10.	Justify why calibration is important in 5G network simulation tools.	2	K2	CO5

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	(i) Briefly discuss the key building blocks of 5G technology.	6	K2	CO1
		(ii) Summarize three main 5G service categories: eMBB, URLLC, and mMTC. Provide detailed examples.	7	K2	CO1
		OR			
	b)	Describe the basic concepts and architecture of 5G in detail. Compare the 5G network architecture with that of 4G LTE.	13	K2	CO1
12.	a)	Demonstrate how various transceiver algorithms are used to enhance spectral efficiency, reduce complexity, and improve overall system performance in massive MIMO systems.	13	K2	CO2
		OR			
	b)	Analyze the beamforming techniques used in 5G networks. Explain how these techniques enhance spectral efficiency and coverage.	13	K2	CO2

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

13.	a)	Elaborate on the principle of non-orthogonal multiple access (NOMA) in 5G. Show how NOMA improves spectral efficiency and user fairness compared to orthogonal schemes.	*13*	*K2*	*CO3*
		OR			
	b)	Describe in detail about the 5G wireless propagation channel models and their requirements.	*13*	*K2*	*CO3*
14.	a) (i)	Investigate how the key enablers of joint transmission in CoMP contribute to performance improvements in 5G networks.	*6*	*K3*	*CO4*
	(ii)	Examine the role of buffer-aided relaying in enhancing link reliability and throughput in 5G networks.	*7*	*K3*	*CO4*
		OR			
	b)	Analyze the concept of multi-flow wireless transmission in 5G networks. Provide how it improves user throughput and network capacity.	*13*	*K3*	*CO5*
15.	a)	Evaluate massive machine-type communication (mMTC) in 5G technology as a key enabler of the Internet of Things (IoT). Discuss how 5G supports the scalability, connectivity, and energy efficiency essential for mMTC in IoT applications.	*13*	*K2*	*CO5*
		OR			
	b)	Assess the benefits and challenges of multi-hop device-to-device (D2D) communication in 5G networks. Also, explain the concept of multi-operator D2D communication.	*13*	*K2*	*CO5*

PART - C (1 × 15 = 15 Marks)

16.	a)	Analyze the radio access schemes used for massive machine-type communication (mMTC) in 5G, including modulation schemes, coverage enhancement, and power-saving mechanisms. Highlight the key differences from traditional LTE-based solutions.	*15*	*K3*	*CO3*
		OR			
	b)	Examine the emerging challenges in the modeling of 5G networks, particularly for MTC and D2D.	*15*	*K3*	*CO5*