Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

End - Term Examinations – December 2025

Date: 09- 12-2025 **Time:** 01:00pm – 04:00pm

School: SOE	**Program:** B. Tech	
Course Code: ECE3056	**Course Name:** Wireless Communication and Networks	
Semester: VII	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	CO1	CO2	CO3	CO4	CO5	CO6
Marks	12	14	14	12	24	24

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1.	Define half duplex and full duplex communication.	2 Marks	L1	CO1
2.	What do you mean by forward and reverse channel?	2 Marks	L1	CO2
3.	What is MSC?	2 Marks	L1	CO2
4.	Differentiate between fixed channel assignment and dynamic channel assignment.	2 Marks	L1	CO3
5.	Differentiate between hard handoff and soft handoff.	2 Marks	L1	CO3
6.	List four advantages of using spread spectrum techniques.	2 Marks	L1	CO4
7.	What is the primary objective of using diversity techniques in wireless communication?	2 Marks	L1	CO5
8.	Write the difference between transmit diversity and receive diversity.	2 Marks	L1	CO5
9.	List any two differences between wired LAN and wireless LAN.	2 Marks	L1	CO6
10.	Mention any two applications of WPAN technologies.	2 Marks	L1	CO6

Part B

Answer the Questions. **Total Marks 80M**

11.	**a.**	Explain the major limitations of wireless networks.	**10 Marks**	**L2**	**CO1**
	b.	If a total of 33 MHz of bandwidth is allocated to a particular FDD cellular telephone system which uses two 25 kHz simplex channels to provide full duplex voice and control channels, compute the number of channels available per cell if a system uses (i) 4-cell reuse, (ii) 7-cell reuse, and (iii) 12-cell reuse. If 1 MHz of the allocated spectrum is dedicated to control channels, determine an equitable distribution of control channels and voice channels in each cell for each of the three systems.	**10 Marks**	**L3**	**CO2**
		Or			
12.	**a.**	Write a detailed note on paging systems and cordless telephone systems.	**10 Marks**	**L2**	**CO1**
	b.	Explain the concept of frequency reuse and the capacity of a cellular system, and discuss the method used to locate co-channel cells within a cellular system.	**10 Marks**	**L2**	**CO2**

13.	**a.**	Explain Sectoring and Microcells in detail, and include suitable diagrams to illustrate both concepts.	**10 Marks**	**L2**	**CO3**
	b.	Describe in detail the principles and operation of Direct Sequence Spread Spectrum (DSSS) and Frequency Hopping Spread Spectrum (FHSS).	**10 Marks**	**L2**	**CO4**
		Or			
14.	**a.**	Describe the two primary forms of system-generated cellular interference: co-channel interference and adjacent-channel interference. Then, calculate the SIR at the edge of a cell for a cluster size of 7, assuming a path-loss exponent of 4.	**10 Marks**	**L3**	**CO3**
	b.	Explain Frequency Division Multiple Access (FDMA) in detail and discuss its drawbacks.	**10 Marks**	**L2**	**CO4**

15.	**a.**	Write a note on maximal ratio combining and equal gain combining techniques, explaining their principles of operation and how they utilize signals from multiple antennas to improve reception quality.	**10 Marks**	**L2**	**CO5**
	b.	Explain the concept of precoding in multi-antenna wireless communication systems and discuss its classification into single-user MIMO and multi-user MIMO precoding.	**10 Marks**	**L2**	**CO5**

Or					
16.	**a.**	Explain the Alamouti transmit diversity scheme used for a system with two transmit antennas and one receive antenna.	**10 Marks**	**L2**	**CO5**
	b.	Using the selection diversity concept, compute the probability that the output power of the system falls 5 dB below the mean branch power for antenna configurations with N_r = 1, 2 and 4. Convert the 5 dB threshold to its linear value and apply the cumulative distribution function for selection diversity to determine the probability that the output power remains below this threshold. Then, consider a system with two transmit antennas (N_t = 2) where the two diversity branches have unequal mean powers of $1.5\bar{\gamma}$ and $0.5\bar{\gamma}$. Apply the selection diversity outage expression for unequal branch powers and determine how the probability of the output power falling below the threshold changes compared to the equal-power case.	**10 Marks**	**L3**	**CO5**

17.	**a.**	Explain the evolution of Wireless LAN (WLAN) technology and compare the IEEE 802.11a, 802.11b, and 802.11g standards, highlighting their advantages and disadvantages.	**20 Marks**	**L2**	**CO6**
Or					
18.	**a.**	Describe the IEEE 802.11 MAC architecture and its frame format in detail. Explain the functions of the address fields—RA, TA, DA, SA, and BSSID. Also discuss active and passive scanning procedures used by a station to join a WLAN.	**20 Marks**	**L2**	**CO6**