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 **Bengaluru**

 **School of Engineering**

 **End - Term Examinations – January 2025**

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| **Semester**: VII | **Date**: 09-01-2025 |
| **Course Code**: ECE3056  | **Time**: 09:30am – 12:30pm |
| **Course Name**: Wireless Communication and Networks | **Max Marks**: 100 |
| **Program:** B. Tech ECE | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **12** | **12** | **38** | **38** |  |

 **Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

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| **Answer ALL the Questions. Each question carries 2marks. 2Mx10Q=20M** |
| **1** | What are different transmission modes available in communication system | **2 Marks** | **L2** | **CO1** |
| **2** | Write short note on Beamforming in MIMO Systems | **2 Marks** | **L2** | **CO3** |
| **3** | Consider Global System for Mobile, that uses 25MHz, which is broken into radio channels of 200KHz. If 8 speech channels are supported on a single radio channel, and if no guard band is assumed, Find the no. of simultaneous active users that can be accommodated in GSM | **2 Marks** | **L3** | **CO2** |
| **4** | What are the three different power classes of Bluetooth devices | **2 Marks** | **L1** | **CO4** |
| **5** | What are the different diversity modes available for MIMO systems | **2 Marks** | **L1** | **CO3** |
| **6** | What are the different cases or scenarios where the MIMO transmission categorize for the amount of Channel State information requirements | **2 Marks** | **L1** | **CO3** |
| **7** | What are the three functional entities of Layer 1 in IEEE802.11 | **2 Marks** | **L2** | **CO4** |
| **8** | Write a short note on UWB in IEEE802.15 standard | **2 Marks** | **L1** | **CO4** |
| **9** | Define PCF inter frame space and DCF inter frame space | **2 Marks** | **L2** | **CO4** |
| **10** | Draw the block diagram for Maximum Ratio combining receive diversity technique | **2 Marks** | **L2** | **CO3** |

**Part B**

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| **Answer ALL Questions. Each question carries 20 marks. 4QX20M=80M** |
| **11** | **11a** | 1. Explain the difference between wired and wireless communication
2. What are the three different transmission modes of communication
3. State different types of wireless communication in our daily life
4. What are forward and reverse channels in cellular network
5. Draw the electromagnetic spectrum

Explain each question with minimum 3 points | **10 Marks** | **L2** | **CO1** |
| **11b** | 1. Compute the probability that output power of the selection diversity system is 5 dB lower than the mean power of each branch when using Nr = 1,2,4 antennas
2. Consider now the case that Nr = 2, and that the mean power in the branches are 1.5 mean SNR and 0.5 mean SNR. How does the result change?
 | **10 Marks** | **L2** | **CO3** |
| **Or** |
| **12** | **12a** | Explain with its features and architecture of GPRS in cellular system with a neat diagram | **10 Marks** | **L1** | **CO1** |
| **12b** | Explain about transmit diversity scheme with equation and explain the diversity gain of the Alamouti scheme | **10 Marks** | **L3** | **CO3** |
|  |  |  |  |  |  |
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| **13** | **13a** | Explain about the Direct sequence spread spectrum transmitter and receiver with neat diagram | **10 Marks** | **L2** | **CO2** |
| **13b** | Draw ad explain the FHSS Physical layer detailing about the modulation method, power level, with explanation about the 3 functional entities | **10 Marks** | **L2** | **CO4** |
| **Or** |
| **14** | **14a** | Explain about any 2 WPAN technologies in detail  | **10 Marks** | **L2** | **CO4** |
| **14b** | Explain about the CDMA technique and how capacity is measured in cellular systems | **10 Marks** | **L2** | **CO2** |
|  |  |  |  |  |  |
| **15** | **15a** | Explain precoding technique with neat diagram for both single user and multi user environments | **10 Marks** | **L2** | **CO3** |
| **15b** | Explain the Single input and multiple output system and define the power gain and diversity gain | **10 Marks** | **L3** | **CO3** |
| **Or** |
| **16** | **16a** | Draw and explain the any one Selection diversity schemes  |  **10 Marks** | **L2** | **CO3** |
| **16b** | Draw and explain the Maximum Ratio combining and draw the competitive chart for N = 1, 2,3 antenna elements | **10 Marks** | **L2** | **CO3** |
|  |  |  |  |  |  |
| **17** | **17a** | State the different types of MAC frames and also provide example for each one of them with neat diagram  | **10 Marks** | **L1** | **CO4** |
| **17b** | What are the sublayers of PHY Layer of IEEE802.11 WLAN and explain the functionality of each sublayer | **10 Marks** | **L2** | **CO4** |
| **Or** |
| **18** | **18a** | List all the nine services of Layer 2 in IEEE802.11 WLAN | **10 Marks** | **L1** | **CO4** |
| **18b** | What are the active scanning mode and passive scanning mode for a station to joining a wireless network | **10 Marks** | **L2** | **CO4** |