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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **End - Term Examinations – JANUARY 2025** |
| Date: 07 - 01- 2025 Time: 09:30 am – 12:30 pm |

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| **School:** SOCSE | **Program:** B.Tech-CSE | |
| **Course Code :** CSE3090 | **Course Name :** 5G Networking | |
| **Semester**: VII | **Max Marks**: 100 | **Weightage**: 50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **26** | **26** | **26** | **24** | **24** |

**Instructions:**

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

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 2marks. 10Q x2M=20M** | | | | |
| **1** | What is a communication channel in wireless networks? | **2 Marks** | **L1** | **CO1** |
| **2** | How does 5G achieve ultra-low latency in eMBB applications? | **2 Marks** | **L3** | **CO1** |
| **3** | What is the effect of interference in 5G channel models, especially in dense urban areas? | **2 Marks** | **L1** | **CO1** |
| **4** | Mention the significance of 5G Core Network (5GC)? | **2 Marks** | **L2** | **CO2** |
| **5** | Identify the function of the User Plane Function (UPF) in 5G? | **2 Marks** | **L2** | **CO2** |
| **6** | State the frequency bands are used for 5G? | **2 Marks** | **L1** | **CO2** |
| **7** | Differentiate Device-to-Device (D2D) communication and traditional cellular communication. | **2 Marks** | **L2** | **CO3** |
| **8** | List the major challenges associated with D2D communication in 5G? | **2 Marks** | **L1** | **CO3** |
| **9** | Predict the significance of Dynamic Time Division Duplex (TDD) in 5G NR for uplink and downlink scheduling? | **2 Marks** | **L2** | **CO4** |
| **10** | Describe the different types of V2X communications | **2 Marks** | **L1** | **CO4** |

**Part B**

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| **Answer the Questions Total 80 Marks.** | | | | | |
| **11.** | **a.**  **b.** | Describe the evolution from 3G to 4G technologies, with an emphasis on LTE and its impact on mobile internet usage.  Explain the concept of Key Performance Indicators (KPIs) in mobile communication networks and provide examples for 5G networks. | **10 Marks**  **10 Marks** | **L1**  **L2** | **CO1** |
| **or** | | | | | |  |  |  | **L2** |
| **12.** | **a.**  **b.** | Determine how do mobile operators ensure Quality of Service (QoS) in 5G to meet the diverse needs of applications like AR/VR, IoT, and autonomous vehicles?  Explain the role of the Lean System Control Plane in optimizing signaling and network management in 5G. | **10 Marks**  **10 Marks** | **L3**  **L2** | **CO1** |
|  |  |  |  |  |  |
| **13.** | **a.**  **b.** | Explain the concept of SDN and its role in 5G networks.  Explain the concept of dual connectivity in 5G and its role in multi-RAT coordination. | **10 Marks**  **10 Marks** | **L2**  **L2** | **CO2** |
| **or** | | | | | |
| **14.** | **a.**  **b.** | Predict how do NFV and SDN work together to support the dynamic nature of 5G networks?  Illustrate how do operators plan and deploy 5G networks with regard to spectrum availability and coverage? | **10 Marks**  **10 Marks** | **L3**  **L3** | **CO2** |

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| **15.** | **a.**  **b.** | Identify how does D2D in 5G enhance the efficiency of the overall network compared to 4G LTE  Identify how does METIS (Mobile and wireless communications Enablers for the Twenty-twenty Information Society) contribute to the development of public safety requirements for 5G D2D? | **10 Marks**  **10 Marks** | **L3**  **L3** | **CO3** |
| **Or** | | | | | |
| **16.** | **a.**  **b.** | What is the trade-offs involved in the system design of D2D communication, especially in terms of power consumption, latency, and throughput?  How does the combination of D2D and multi-hop communication support network resilience during natural disasters? | **10 Marks**  **10 Marks** | **L1**  **L3** | **CO3** |

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| **17.** | **a.**  **b.** | Compare and contrast Orthogonal Frequency Division Multiple Access (OFDMA) with Frequency Division Multiple Access (FDMA).  Predict how the interference and noise impact the capacity of multi-access systems in wireless communication? | **10 Marks**  **10 Marks** | **L4**  **L3** | **CO4** |
| **Or** | | | | | |
| **18.** | **a.**  **b.** | Identify the use of massive MIMO (Multiple Input Multiple Output) technology enhance radio access in dense 5G deployments?  Specify how the radio access technology (RAT) supports vehicle-to-everything (V2X) communication? | **10 Marks**  **10 Marks** | **L3**  **L6** | **CO4** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***