Sl. No.

B3.E8-R5 : WIRELESS AND MOBILE COMMUNICATION

NOTE :
1. **Answer question 1 and any FOUR questions from 2 to 7.**
2. **Parts of the same question should be answered together and in the same sequence.**

Total Time : 3 Hours   **Total Marks : 100**

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1. (a) Explain the concept of multipath fading in wireless communication.

(b) Define the term BER and explain how it is measured.

(c) Explain the difference between a narrowband and a broadband system.

(d) What is the purpose of handover in mobile communication ? Explain with an example.

(e) Define the architecture of Wireless Sensor Networks (WSNs).

(f) Explain the difference between Time Division Multiple Access (TDMA) and Frequency Division Multiple Access (FDMA).

(g) Define the terms VRAN and ORAN.   **(7x4)**

2. (a) Define the standard IEEE 802.11ac. Specify the key Features of the standard over existing IEEE 802.11n.

(b) Sketch a neat diagram explaining the need of Mobile IP. Compare and contrast Mobile IPv4 and Mobile IPv6.

(c) Discuss the trade-offs between power consumption and data transfer rates in different versions of Bluetooth, and explain how these trade-offs impact the design of wireless sensor networks and other Bluetooth-enabled devices.   **(6+6+6)**

3. (a) What are the main components of an Software Define Network (SDN) architecture, and how do they interact with each other ?

(b) How does Multiple Input Multiple Output (MIMO) technology help to mitigate the effects of multipath interference and fading in wireless communication systems ?

(c) Explain the differences between the Optimized Link State Routing (OLSR) and Dynamic Source Routing (DSR) wireless routing protocols, and discuss the trade-offs between these two protocols in terms of scalability, overhead, and route discovery time.   **(6+6+6)**

4. (a) How does Bluetooth Low Energy (BLE) differ from previous versions of Bluetooth, and what advantages does it offer for certain types of applications ?

(b) What is Fast-Handoff in Wireless Network ?

(c) What are the factors that affect WLAN performance, such as channel interference, distance, data rate, and signal strength ? Explain how each factor affects WLAN performance and what measures can be taken to mitigate their impact.   **(6+4+8)**

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5. (a) What are the security mechanisms provided by the IEEE 802.11 standards, and how do they work ?

(b) Calculate the channel capacity if Signal to Noise Ratio (SNR) is given as 10 dB and bandwidth is 10 MHz.

(c) Give the tabular description of different modulation scheme AM, FM, PM, ASK, FSK, PSK, and QAM. **(6+5+7)**

6. (a) What are the trends and future directions in Power Over Ethernet (POE) infrastructure, and how are they expected to impact network design and deployment ?

(b) Calculate the Fraunhofer distance for an antenna that has a maximum dimension of 5 meter and operates at a frequency of 1100 MHz.

(c) What is WiMAX ? Discuss the responsibility of its MAC layer and define the frame structure and various MAC fields such as DLMAP, DCD, ULMAP and UCD and their significance. **(5+5+8)**

7. (a) What is LoRA WAN ? Discuss the roles and responsibilities of different layers used in LoRA WAN.

(b) "An access point serves as a central hub for wireless devices to connect and communicate with each other and with the wired network." Explain with an example.

(c) Discuss the specific design issues which need to be addressed while designing the cellular network. **(7+6+5)**

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