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Total No. of Printed Pages: 2

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B. Tech EE (Semester 5th/6th/8th)
FUNDAMENTALS OF WIRELESS COMMUNICATION
Subject Code: BECEO1-003
Paper ID: [18OE111524]

Time: 03 Hours

Maximum Marks: 60

Instruction for candidates:

1. Section A is compulsory. It consists of 10 parts of two marks each.
2. Section B consist of 5 questions of 5 marks each. The student has to attempt any 4 questions out of it.
3. Section C consist of 3 questions of 10 marks each. The student has to attempt any 2 questions.

Section – A

(2 marks each)

Q1. Attempt the following:

- a. What are the differences between wireless and fixed telephone networks?
- b. Define paging systems and cordless telephone systems.
- c. Briefly explain the concept of cellular telephone systems.
- d. What is VoLTE?
- e. Compare the first and second generations of wireless communication.
- f. Define Frequency Division Multiple Access (FDMA).
- g. Calculate the time slot duration for a TDMA system if the total frame duration is 40 ms and the number of users is 8.
- h. What is Wi-Fi?
- i. Describe the concept of Bluetooth in wireless communication.
- j. A cell in a wireless system has a radius of 2 km. Calculate the area covered by this cell assuming a circular geometry.

Section – B

(5 marks each)

- Q2. Explain the evolution of different generations of wireless communication from 1G to 5G.
- Q3. Compare the frequency reuse factor in a cellular system where each cell is allocated a bandwidth of 20 MHz and divided into 5 sectors with a system where cells are not sectorized.
- Q4. A wireless communication system using TDMA operates at a total bandwidth of 10 MHz. The system divides the bandwidth into 50 time slots. If each user is allocated one time slot, calculate:
 - (a) The bandwidth per time slot.

- (b) The total data rate per user if each user can utilize the entire allocated bandwidth during their time slot and the modulation scheme provides 4 bits per Hz.
- Q5. Discuss the importance of Personal Area Networks (PAN) in modern wireless communications networks.
- Q6. A Wi-Fi network operates on a 20 MHz bandwidth and uses an 802.11ac standard with a modulation scheme providing a spectral efficiency of 8 bps/Hz. Calculate:
- The maximum theoretical data rate that can be achieved.
 - If the network utilizes only 75% of this data rate due to overhead, what would be the actual data rate?

Section – C

(10 marks each)

- Q7. Describe the various types of common wireless systems with suitable examples. Provide detailed explanations for paging systems, cordless telephone system and cellular telephone systems.
- Q8. Discuss in detail the introduction, operation and comparison of different multiple access techniques in wireless communication.
- Q9. Explain the working principles of Wi-Fi and WiMAX. Compare their architectures, data rates and typical applications in wireless networks.