Roll No…….. **Total No. of Printed Pages: 2**

Total No. of Questions: [09]

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:

a The maximum theoretical data rate that can be achieved.

b 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.