

CLUSTER UNIVERSITY OF SRINAGAR

Bachelors in Information Technology

Semester: 5TH

Course Type: MINOR

Programme: UG



Course Code: UGICT22N501

Credits: 4 (Theory: 3, Practical: 1)

Contact Hrs.: 75 (Theory: 45, Practical: 30)

Max. Marks: 100

Theory External: 60; Min Marks: 24

Theory Internal: 15 Marks, Min Marks: 06

Practical External: 15 Marks, Min. Marks: 06

Practical Internal: 10 Marks, Min. Marks: 04

Title: Wireless and Mobile Communication

COURSE OBJECTIVES:

- To introduce the fundamentals of wireless and mobile communication.
- To understand cellular communication and mobile network concepts.
- To familiarize students with GSM, 3G, 4G, LTE and 5G technologies.
- To introduce wireless technologies, sensors, WSN and IoT.
- To develop basic practical skills in wireless and mobile communication.

COURSE CONTENT:

Unit I: Fundamentals of Wireless and Cellular Communication

Introduction to wireless communication, characteristics, advantages and limitations, applications of wireless communication, wireless transmission, frequency, bandwidth and spectrum, cellular concept, cell structure, frequency reuse, channel allocation, co-channel and adjacent-channel interference, cell splitting, sectoring and handoff.

Unit II: Mobile Communication Systems

Evolution of mobile communication from 1G to 5G and introduction to 6G, GSM and its architecture, Mobile Station, Base Transceiver Station (BTS), Base Station Controller (BSC), Mobile Switching Centre (MSC), Home Location Register (HLR) and Visitor Location Register (VLR), GSM services and channels, GPRS and EDGE, CDMA, 3G and UMTS, 4G and LTE, 5G technology, features and applications.

Unit III: Wireless Technologies, Sensors and IoT

Multiple access techniques including FDMA, TDMA, CDMA and OFDMA, spread spectrum communication including Frequency Hopping Spread Spectrum (FHSS) and Direct Sequence

Handwritten signatures and text: "Zareka" and other illegible signatures.

Spread Spectrum (DSSS), Wi-Fi and IEEE 802.11, Bluetooth, Zigbee and GPS, introduction to sensors, types of sensors, analog and digital sensors, sensor nodes and their basic components, Wireless Sensor Networks and their applications, Mobile Ad-hoc Networks, Internet of Things and the role of sensors and wireless communication in IoT, basic wireless security.

UNIT IV: PRACTICALS

- Study and compare 2G, 3G, 4G and 5G mobile communication technologies.
- Identify the network type, signal strength, network operator, IP address and IMEI of a mobile device.
- Configure a Wi-Fi/mobile hotspot and demonstrate wireless communication between devices using Wi-Fi or Bluetooth.
- Demonstrate the basic working of FDMA, TDMA, CDMA and OFDMA using suitable simulation software.
- Identify and demonstrate basic sensors such as temperature, light, motion or proximity sensors and observe their outputs.
- Demonstrate a simple IoT application in which sensor data is collected and transmitted wirelessly using Wi-Fi or Bluetooth.

COURSE OUTCOMES: After completion of the course, students will be able to:

- Explain the basic concepts of wireless and cellular communication.
- Describe the working and evolution of mobile communication systems.
- Differentiate major wireless technologies and multiple access techniques.
- Explain the role of sensors, WSN and IoT in wireless communication.
- Perform basic practical demonstrations involving mobile networks, Wi-Fi, Bluetooth, sensors and IoT.

Text Books

1. T. S. Rappaport, *Wireless Communications: Principles and Practice*, 2nd Edition, Pearson Education.
2. Jochen Schiller, *Mobile Communications*, 2nd Edition, Pearson Education.

Reference Books

1. William C. Y. Lee, *Mobile Communication Engineering*, McGraw-Hill.
2. Andrea Goldsmith, *Wireless Communications*, Cambridge University Press.

