

THE OPEN UNIVERSITY OF SRI LANKA
DEPARTMENT OF COMPUTER SCIENCE
B.Sc. (IT) DEGREE PROGRAMME 2026/2027
LEVEL 05
ITU5304 – WIRELESS AND CELLULAR NETWORKS
FINAL EXAMINATION
DURATION: TWO HOURS ONLY (2 HOURS)



00072

Date: 01.07.2026

Time: 1.30 p.m – 3.30 p.m

General Instructions.

- Read all instructions carefully before answering the questions.
 - This question paper consists of 06 questions on 03 pages.
 - Answer any 04 questions only. All questions carry equal marks.
 - The answer for each question should commence on a new page.
 - Involvement in any activity that is considered an exam offense will lead to punishment.
 - Use blue or black ink to answer the questions.
 - Clearly state your index number in your answer script.
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Question 01 (Total: 25 Marks)

1. “Wireless communication sends information without using physical cables.”
 - a) State the three major components involved in wireless communication between the information source and destination. *(03 Marks)*
 - b) Give one simple example of wireless communication. *(01 Mark)*
2. Explain three challenges in wireless communication systems. *(06 Marks)*
3. Explain two real-world examples of composite signals. *(05 Marks)*
4. Describe Code Division Multiplexing (CDM) and Frequency Division Multiplexing (FDM) with their basic working principles. *(05 Marks)*
5. Explain the relationship between frequency and wavelength in the electromagnetic spectrum with the relevant formula. *(05 Marks)*

Question 02 (Total: 25 Marks)

1. State three basic components of a Wireless Local Area Network (WLAN). *(03 Marks)*
2. Explain the following network components in WLAN. *(06 Marks)*
 - a) Basic Service Set (BSS)
 - b) Extended Service Set (ESS)
 - c) Service Set Identifier (SSID)
3. Compare and contrast Bluetooth technology and Wi-Fi *(06 Marks)*
4. Describe the concept of antenna gain and explain its importance in antenna systems. *(04 Marks)*
5. Explain the following antenna types and their application area *(06 Marks)*
 - a) Dipole Antenna
 - b) Parabolic Reflector Antenna
 - c) MIMO Antenna

Question 03 (Total: 25 Marks)

1. State three TCP optimization techniques used to improve network performance. *(03 Marks)*
2. Explain how Mobile IP and TCP contribute to the following real-world scenarios. *(04 Marks)*
 - a. Browsing social media while traveling
 - b. Attending meetings via zoom
3. Differentiate between Hexagonal Cellular Topology and Sectorized Cellular Topology using suitable diagrams. *(06 Marks)*
4. Explain the main components of a cellular system and describe their functions. *(07 Marks)*
5. Identify five major challenges faced in cellular communication systems. *(05 Marks)*

Question 04 (Total: 25 Marks)

1. Identify the three main subsystems in GSM architecture. *(03 Marks)*
2. Explain the following terms used in GSM networks. *(08 Marks)*
 - a. HLR and VLR
 - b. IMEI and IMSI
3. Illustrate the incoming call flow in a GSM network with the main steps involved. *(05 Marks)*
4. Discuss the basic GSM frame structure (one GSM frame) with a suitable diagram and relevant time slots. *(05 Marks)*
5. Outline the major improvements introduced by GSM in cellular communication compared with earlier analog systems. *(04 Marks)*

Question 05 (Total: 25 Marks)

1. Explain two types of satellites and their application areas in communication systems *(06 Marks)*
2. Identify and explain the main disadvantages of satellite communication. *(04 Marks)*
3. Explain the purpose and function of the following devices used in satellite communication *(05 Marks)*
 - a. Dish Antenna
 - b. Low Noise Block Converter (LNB)
4. Discuss the importance and need for wireless network security in modern communication systems
(04 Marks)
5. Explain the 4G LTE security architecture by describing its three main subdivisions and their functions *(06 Marks)*

Question 06 (Total: 25 Marks)

1. Explain the primary functions of a NodeB in a 3G network. *(04 Marks)*
2. Discuss the benefits of Voice over LTE (VoLTE) in a 4G network. *(05 Marks)*
3. Compare and contrast 3G and 4G networks based on their key features and performance characteristics. *(06 Marks)*
4. Explain the main features introduced in LTE-Advanced and their significance. *(04 Marks)*
5. Describe three major applications of 5G networks and explain three key challenges associated with 6G networks. *(06 Marks)*

**** END OF THE PAPER ****