KAIMOSI FRIENDS UNIVERSITY

FOURTH YEAR SECOND SEMESTER UNIVERSITY EXAMINATIONS

2025/2026 ACADEMIC YEAR

SPECIAL EXAMINATIONS

FOR THE DEGREE OF BACHELOR OF SCIENCE INFORMATION TECHNOLOGY

COURSE TITLE: ADVANCED WIRELESS AND MOBILE NETWORKS

COURSE CODE: BIT 443E:

DATE: 22/6/2026 **TIME: 3-5PM**

INSTRUCTIONS TO STUDENTS

1. Answer **QUESTION ONE** and **ANY OTHER TWO** from the choices given.
2. Phones, smart watches, ear phones or any other unauthorized digital and AI gadgets and applications are **NOT ALLOWED IN** the examination room.
3. Answer all questions in the exam answer booklet provided.
4. Do not write on this question paper.
5. All KAFU examination rules and regulations apply.
6. DURATION OF EXAMINATION: **TWO (2) HOURS**

KAFU observes ZERO tolerance to examination cheating.

QUESTION ONE (30 MARKS) — COMPULSORY

a) Differentiate between circuit switching and packet switching in the context of mobile communication systems. (4 Marks)

b) Describe the role of the electromagnetic spectrum in wireless communication and state why spectrum allocation is regulated. (4 Marks)

c) Identify and describe two causes of signal degradation in wireless networks. (4 Marks)

d) Examine how base stations coordinate communication between mobile devices and the core network. (6 Marks)

e) Discuss how propagation delay and bandwidth influence wireless network performance. (6 Marks)

f) Assess the importance of power control in reducing interference and improving cellular network efficiency. (6 Marks)

QUESTION TWO (20 MARKS)

a) Describe the function of the IEEE 802.11 standard in wireless networking. (4 Marks)

b) Distinguish between **infrastructure mode** and **ad hoc mode** in wireless LANs. (6 Marks)

c) A university wireless network experiences frequent packet collisions during busy hours. Examine how backoff algorithms help reduce collisions in wireless networks. (5 Marks)

d) Discuss the role of MAC layer coordination in ensuring fair access to the wireless medium. (5 Marks)

QUESTION THREE (20 MARKS)

a) Define frequency planning and discuss its importance in cellular network design. (4 Marks)

b) Describe how cluster size affects capacity and interference in cellular systems. (4 Marks)

c) A mobile operator introduces smaller cells in a city center. Assess the expected effects on coverage, interference, and handover frequency. (6 Marks)

d) Discuss how modern cellular systems manage limited spectrum resources. (6 Marks)

QUESTION FOUR (20 MARKS)

a) Describe the process of location updating in cellular networks. (4 Marks)

b) Examine the importance of roaming in mobile communication systems. (4 Marks)

c) Compare the key performance characteristics of 4G and 5G networks. (6 Marks)

d) Discuss the role of all-IP architecture in improving modern mobile networks. (6 Marks)

QUESTION FIVE (20 MARKS)

a) Distinguish between cell splitting and cell sectoring. (4 Marks)

b) Discuss how packet loss affects Quality of Service in wireless networks. (4 Marks)

c) Examine the operational principles of Wireless Sensor Networks. (6 Marks)

d) Assess the role of edge computing in improving performance of modern wireless applications. (6 Marks)