



**GENERAL SIR JOHN KOTELAWALA DEFENCE UNIVERSITY**

Faculty of Engineering  
BSc in Electronic and Telecommunication Engineering Degree

BSc Engineering Degree  
Semester 8 Examination - December 2022  
(Intake 36 - ET)

**ET 4283 - WIRELESS AND MOBILE COMMUNICATION**

Time allowed: 2 hours

14<sup>th</sup> December 2022

### **INSTRUCTIONS TO CANDIDATES**

This paper contains 4 questions on 3 pages.

Answer all FOUR questions and each question carries equal marks

This is a closed book examination

This examination accounts for 70% of the module assessment. A total maximum mark obtainable is 100. The marks assigned for each question and parts thereof are indicated in brackets

If you have any doubt as to the interpretation of the wordings of a question, make your own decision, but clearly state it on the answer script

Assume reasonable values for any data not given in or provided with the question paper, clearly make such assumptions made in the answer script

All examinations are conducted under the rules and regulations of the KDU

### Question 1

- a) Briefly explain the Service Based Architecture of the 5G network. (8 marks)
- b) What is 5G numerology, explain. (5 marks)
- c) Compare 5G usage scenarios of eMBB, uRLLC and mMTC. (6 marks)
- d) Explain the difference between Network Function Virtualization (NFV) and Software Defined Networks (SDN) used in 5G networks. (6 marks)

### Question 2

- a) Briefly explain the Direct Sequence Spread Spectrum (DSSS) WCDMA System. (6 marks)
- b) Explain difference between Link adaptation and power control in UMTS. (5 marks)
- c) Briefly explain HSDPA and HSUPA key functionalities in comparison to the UMTS. (6 marks)
- d) Compare UTRAN and E-UTRAN architectures and write key differences. (8 marks)

### Question 3

- a) Draw a block diagram of GSM System architecture and indicate the main network elements. (8 marks)
- b) Briefly explain the GSM TDMA/FDMA physical channel structure. (6 marks)
- c) What is GPRS? Briefly explain the GPRS system architecture. (6 marks)
- d) Briefly explain the HARQ process and why it is important in Mobile Communication? (5 marks)

### Question 4

- a) Briefly explain OFDMA principal and discuss the advantages over WCDMA system. (8 marks)
- b) Briefly explain the Resource Block in LTE? and Why does LTE uplink use SC-FDMA instead of OFDMA? (6 marks)
- c) Explain difference between PDSCH and PDCCH physical channels. (5 marks)
- d) State the 3 key LTE security pillars and explain them. (6 marks)

————— End of question paper —————