



# TECHNICAL UNIVERSITY OF MOMBASA

---

Faculty of Engineering and Technology

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

## UNIVERSITY EXAMINATION FOR:

BACHELOR OF TECHNOLOGY IN ELECTRICAL & ELECTRONIC ENGINEERING

ETI 2309 MOBILE COMMUNICATION

END OF SEMESTER EXAMINATION

**SERIES: 2019**

**TIME: 2 HOURS**

**DATE: JULY 2019**

### Instructions to Candidates

You should have the following for this examination

*Answer Booklet, examination pass and student ID*

This paper consists of **FIVE** questions. Attempt any **THREE** questions.

**Do not write on the question paper.**

---

### Question ONE

- (a) Describe the following mobile radio classifications using appropriate examples  
(i) Simplex (ii) Half-duplex (iii) Full duplex (10 marks)
- (b) Distinguish any **THREE** features between a paging and cordless system. (6 marks)
- (c) Using appropriate sketches highlight the essential characteristics of the following access techniques:  
(i) FDMA (ii) TDMA (4 marks)
- (d) Explain any **FOUR** operational features of the ZigBee network (4 marks)

### Question TWO

- (a) Using an appropriate diagram describe the general architecture of the GSM network. (9 marks)
- (b) Highlight any **THREE** features of the following cellular network types:  
(i) 2G (ii) 3G (iii) 4G (9 marks)
- (c) Distinguish between Wi-Max and Wi-fi wireless systems. (2 marks)

### Question THREE

- (a) Using an appropriate diagram describe the signalling structure in the GSM system. (11 marks)
- (b) Explain the need for the following operational strategies in cellular systems:
- (i) Frequency hopping (ii) Discontinuous transmission (iii) Discontinuous reception (9 marks)

### Question FOUR

- (a) With reference to cellular systems distinguish between physical and logical channels. (2 marks)
- (b) Explain FOUR tasks which have to be performed by the radio subsystem or physical layer of the cellular network. (8 marks)
- (c) With respect to cellular systems describe the following: (i) Traffic channel (ii) Broadcast control channel (iii) Frequency correction channel and Synchronous channel (6 marks)
- (d) Distinguish between narrow band and wideband TDMA. (6 marks)

### Question FIVE

- (a) Highlight the factors that determine frequency re-use distance of cellular systems. (4 marks)
- (b) Distinguish between (i) Adjacent and co-channel interference. (ii) A cell and cluster (8 marks)
- (c) (i) With the aid of an appropriate diagram and  $K = i^2 + ij + j^2$  show how  $K = 7$  (ii) Making appropriate assumptions and noting that  $P_r = r^\lambda$ ;  $\lambda = 4$  for radio cellular environment show that  $K = 6.48$  (8 marks)