



MACHAKOS UNIVERSITY

University Examinations for 2023/2024 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONIC ENGINEERING

FOURTH YEAR SECOND EMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION
TECHNOLOGY)

SPH407: WAVE GUIDES

DATE:

TIME:

INSTRUCTIONS

Answer question **ONE** and **ANY OTHER TWO** questions

Question One [30 marks]

- (a) Explain the following terms with respect to telecommunication:
- (i) Signal; (2 marks)
 - (ii) Information; (2 marks)
 - (iii) Transmitter. (2 marks)
- (b) (i) Distinguish between a webpage and a website; (3 marks)
- (ii) Explain the term “url” with respect to World Wide Web. (1 mark)
- (c) With the aid of a circuit diagram describe the operation of telephone handset. (12 marks)
- (d) With the aid of a neat diagram describe the operation a microwave radio link.

(8 marks)

QUESTION TWO (20 MARKS)

- (a) Describe how e-mail works in the Internet. (9 marks)
- (b) Explain the following terms with respect to data communication.
- i. Standard; (2 marks)
 - ii. Protocol. (2 marks)
- (c) i. Distinguish between a de-facto and a de-jure standard; (4 marks)
- ii. List the THREE major elements of a protocol. (3 marks)

QUESTION THREE (20 MARKS)

- (a) With the aid of a neat diagram describe the operation of an optical fibre communication link. (12 marks)
- (b) Encode the binary bit patterns 1010110010 using the following encoding techniques:
- (i) NRZ; (2 marks)
 - (ii) Manchester; (2 marks)
 - (iii) Differential Manchester (2 marks)
- (c) Explain the term “logical address” with respect to the Internet. (2 marks)

QUESTION FOUR (20 MARKS)

- (a) Describe the following modulation techniques:
- (i) AM; (2 marks)
 - (ii) FM; (2 marks)
 - (iii) PM. (2 marks)

- (b) Explain why digital transmission of signals performs better in the presence of noise than analogue transmission. (4 marks)
- (c) With the aid of a neat diagram describe the operation of a satellite communication link. (10 marks)

QUESTION FIVE (20 MARKS)

- (a) Describe briefly the origin of the following social networking sites:
- (i) Facebook; (2 marks)
 - (ii) Twitter; (2 marks)
 - (iii) Whatsapp. (2 marks)
- (b) Describe any seven essential things in developing a website. (14 marks)