



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

**FIRST YEAR SECOND SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)**

SIT170: DATA COMMUNICATIONS.

DATE: 14/12/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer one question in section A and any two in section B

SECTION A

QUESTION ONE (30 MARKS) (COMPULSORY)

- a) List four fundamental characteristics of data communication. (4 marks)
- b) Data communication is very critical in a business set up. It enables relay of information and facilitates transactions.
 - i. Discuss five components of data communication. (5 marks)
 - ii. Communication happens in various modes, show one appropriate application for each of the three communications modes in existence. (6 marks)
- c) There had been a lot of complains in Unga international company about the status of their network which had greatly affected their internal communications. Charles was engaged to evaluate the network. As a data communications expert, advice Charles on the three main aspects to guide him in the evaluation process. (6 marks)
- d) A network is two or more devices connected through links. A link is a communications pathway that transfers data from one device to another. Discuss two possible types of connections. (4 marks)
- e) Networks are created to interconnect devices within a defined zone. In this regard highlight five types of networks (5 marks)

SECTION B:

QUESTION TWO (20 MARKS)

- a) Topology is the physical layout of computer devices in a network.
- i. Name **four** types of network topologies. (4 marks)
 - ii. With the aid of a diagram illustrate the layout of any two of the topologies stated in (a) above (4 marks)
 - iii. List the most suitable application for each of the topologies listed in (a) above (4 marks)
- b) Differentiate between analog and digital communication (4 marks)
- c) Differentiate between periodic and non-periodic signals as it applies in communication (4 marks)

QUESTION THREE (20 MARKS)

- a) Discuss the following characteristics of signals. (8 marks)
- i. Peak Amplitude
 - ii. Period and Frequency.
 - iii. Phase
 - iv. Wavelength
- b) Discuss three signal transmission impairments (6 marks)
- c) Explain the following expression in as it applies to signal and noise relationship:
 $SNR_{dB} = 10 \log_{10} SNR$ (4 marks)
- d) Draw a well labeled sine wave (2 marks)

QUESTION FOUR (20 MARKS)

- a) Define multiplexing (1 mark)
- b) State the importance of multiplexing in the current world. (1 mark)
- c) Explain the following terms as used in multiplexing (9 marks)
- i. Frequency-Division Multiplexing
 - ii. Wavelength-Division Multiplexing
 - iii. Time-Division Multiplexing
- d) List two types of fiber optic cables. (2 marks)
- e) Highlight four advantages of using fiber optic cables for communication. (4 marks)
- f) There has been some sluggishness in utilizing fiber optic cables in data communication. Explain the possible reasons for the slow adoption (3 marks)

QUESTION FIVE (20 MARKS)

- a) Differentiate the following (10 marks)
- i. Radio wave and micro wave.
 - ii. Circuit switched and packet switched network
 - iii. Datagram and virtual circuit networks
 - iv. Parallel and serial transmission.
 - v. Synchronous and asynchronous transmission
- b) Describe the role of each layer in the OSI model as listed below. (7 marks)
- i. Physical Layer
 - ii. Data Link Layer
 - iii. Network Layer
 - iv. Transport Layer
 - v. Session Layer
 - vi. Presentation Layer
 - vii. Application Layer
- c) State three devices used in setting up a Local Area Network (LAN) (3 marks)