



# **MACHAKOS UNIVERSITY**

**University Examinations for 2022/2023**

**SCHOOL OF ENGINEERING AND TECHNOLOGY**

**DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY**

**SECOND YEAR SECOND SEMESTER EXAMINATION FOR**

**BACHELOR SCIENCE (INFORMATION TECHNOLOGY)**

**SIT271: DATA COMMUNICATIONS**

**DATE:**

**TIME:**

---

**INSTRUCTIONS: Answer Question ONE and other TWO Questions**

**QUESTION ONE (COMPULSORY) (30 MARKS)**

- a) Define data communication. (2 marks)
- b) Discuss four fundamental characteristics of data communication (8 marks)
- c) Highlight five components of data communication systems (5 marks)
- d) While communicating, objects use different modes. With clear examples, discuss three such modes (6 marks)
- e) You have been employed as a network administrator in a firm. The firm has been contracted by a newly established county government to install Network in its sub-county offices, spanning about 100 kilometers. All devices in the entire county should communicate with each other. Discuss how you would carry out the installation. (9 marks)

**QUESTION TWO (20 MARKS)**

- a) With clear examples, differentiate the following
  - i. Analog and digital data (4 marks)
  - ii. Periodic and non-periodic signal (4 marks)
  - iii. Phase and wavelength (4 marks)
- b) Analyze two causes of impairment in data transmission. (4 marks)
- c) Illustrate how an analog signal is converted to a digital output. (4 marks)

**Question Three (20 Marks)**

- a) Define multiplexing citing its importance (3 marks)
- b) Illustrate how multiplexing is achieved in the following circumstances
  - i. Wave division (3 marks)
  - ii. Time division (3 marks)
  - iii. Frequency division. (3 marks)
- c) Abed was employed as a data communications manager in a learning institution. He did not have any prior knowledge on data communication and thus approaches you for guidance. Advise abed on the two categories of communication media and their application in a network environment. (8 marks)

**QUESTION FOUR (20 MARKS)**

- a) Define a switched network and its importance (3 marks)
- b) With clear illustrations, discuss how the following switching takes place in data communications.
  - i. Circuit switched network (4 marks)
  - ii. Message switched network (4 marks)
  - iii. Packet switched network (4 marks)
- c) Explain five characteristics of a virtual circuit network (5 marks)

**QUESTION FIVE (20 MARKS)**

- a) Differentiate between OSI and TCP/IP models (6 marks)
- b) Demonstrate three differences between IPV4 and IPV6 (6 marks)
- c) A Local Area Network (LAN) utilizes various devices for its functionality. Discuss four devices used in setting up such network and their role in the network. (8 marks)