



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

THIRD YEAR SPECIAL/SUPPLEMENTARY EXAMINATION FOR

BACHELOR OF SCIENCE (COMPUTER SCIENCE)

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

SCO 105: DATA COMMUNICATION TECHNOLOGIES

DATE: 24/3/2021

TIME: 2.00-4.00 PM

INSTRUCTION: Answer Question ONE and any other TWO Question

QUESTION ONE (30 MARKS)

A University college requires a Network that will cater for their administrative and students needs. The users range from lecturers, administrative assistants and students. All types of users need to access the internet through the network. The university management also requires the network to support WIFI access. The university members of staff need to access the university management information system, which should not be accessed by the students. The total number of expected users is 500 at any given time.

- a) Which is the most appropriate network topology for this network. Give the reasons for your answer (2 marks)
- b) What network devices will be used while designing the network? Briefly explain their use (8 marks)
- c) What transmission impairments is the network likely to experience? (8 marks)
- d) What transmission medium will be used to connect the network? Give reasons for your answer (2 marks)
- e) Briefly explain how the user computers will be configured to access the network (4 marks)
- f) How will this network be secured from intruders and students who might attempt to access confidential information such as examinations? (4 marks)
- g) What switching technique might be appropriate for the network. Give reasons for your answer (2 marks)

QUESTION TWO (20 MARKS)

- a) Explain the functions of the seven layers of the OSI model? (7 marks)
- b) What are the advantages of a layered model (4 marks)
- c) Compare and contrast the OSI model and the TCP/IP model (4 marks)
- d) i A university has a network in its main campus ,which type of a network do they have (2 marks)
ii A university has started a centre in Kisumu with about 30 computers, between peer to peer which network type is the most appropriate and for what reasons? (3 marks)

QUESTION THREE (20 MARKS)

- a) Local Area Networks (LANs) require an 'access method' which determines how computers share a common transmission medium. Write down the **two** main approaches for controlling this sharing in wired networks. Briefly explain how each approach operates. (8 marks)
- b) Three physical topologies associated with LANs are: the bus, ring and star topologies. Describe **each one**, highlighting their strengths and weaknesses from a reliability point of view. (12 marks)

QUESTION FOUR (20 MARKS)

- a) Briefly describe circuit switching. (4 marks)
- b) Explain how a packet-switched network works. (4 marks)
- c) Briefly discuss the main differences between TCP (Transmission Control Protocol) and UDP (User Datagram Protocol). (8 marks)
- d) Which of these protocols in (c) is most suitable for developing a 'real time' application? Briefly explain your reasoning. (4 marks)

QUESTION FIVE (20 MARKS)

- a) You have been asked to construct a Local area network for Machakos University. Explain networking devices would you use to construct the network? (10 marks)
- b) Why is the hub becoming obsolete in modern networks? (2 marks)
- c) Why is a router very common in the current world's networks? (2 marks)
- d) Explain the reasons why packet switching is commonly used in data networks. (6 marks)