



MURANG'A UNIVERSITY OF TECHNOLOGY

SCHOOL OF COMPUTING AND INFORMATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

UNIVERSITY POSTGRADUATE EXAMINATION

2023/2024 ACADEMIC YEAR

**FIRST YEAR FIRST SEMESTER EXAMINATION FOR MASTER OF
SCIENCE IN INFORMATION TECHNOLOGY**

SIT – 602 COMMUNICATION NETWORK TECHNOLOGIES

DURATION: 3 HOURS

Instructions to candidates:

1. Answer Any Four questions.
2. Mobile phones are not allowed in the examination room.
3. You are not allowed to write on this examination question paper.

QUESTION ONE (25 MARKS)

- a) A local public University based in Nairobi has Campuses in Meru, Nyeri and Mombasa. The campus operates in a 10 Base 5 Ethernet Network. In the recent past the company has been developing projects that involve teams consisting of members from more than one campus. Each campus has resources that other others do not and they require sharing these resources. The networks have frequent cable problem and more often than not the entire network goes down. The management team would like a networking solution which would network solution which would offer easier troubleshooting. Less down time and WAN communications between sites. In additions the management would like the WAN to be able to continue operation even if one of the WAN links fails.
- i. Identify at least two items at every local site that needs upgrading. (2 marks)
 - ii. What type of WAN connection (link) might you use to connect the three sites to each other? Justify your answer. (3 marks)
 - iii. How many WAN connections will it take to connect the three sites? Show links in a diagram (5 marks)
 - iv. What is the difference between 10 Base 5, 10 Base 2 and 10 Base T? (3 marks)
- b) As a network engineer, you have been tasked to advise management of an international company which is in the process of rolling out a network for the organization. Using diagrams discuss partial mesh, full mesh and star topology in terms of cost and reliability. (12 marks)

QUESTION TWO (25 MARKS)

- a) Assume that you have been employed as a network administrator in a company that deals with online trading. Discuss any five security threats that you would address in order to make the organization safe when transacting business. (10 marks)
- b) Computer networks are designed in a highly structured way to reduce their design complexity. This is achieved by designing series of layers or level for the networks. One of the most important designs implemented in the current networks is TCP – IP model. Describe the model and state the protocols and network devices in each layer. (11 marks)
- c) As a computer networks designer, you have been tasked to design a data communications network for MUT. Discuss the factors that you would consider in selecting either Time Division Multiple Access (TDMA) or Frequency Division Multiple Access (FDMA) media access control mechanisms. (4 marks)

QUESTION THREE (25 MARKS)

- a) A computer network is created when two or more computers are connected together to share information and resources. Identify and explain any other five motivations for establishing computer networks. (5 marks)
- b) A business firm has contracted you to design their local area network (LAN) as an expert describe four network design goals that you would put into consideration during the design. (8 marks)
- c) As a consultant in network designs you have been awarded a contract by Murang'a Water and Sanitation Company to design its network. You have determined to use hierarchical network design model to design their network. With aid of diagram illustrate the design. (12 marks)

QUESTION FOUR (25 MARKS)

- a) As a network engineer you have determined that MUT should use a 27bit subnet mask applied to your 192.168.0.0/24 network.
- Calculate the possible created subnets (6 marks)
 - Show range of usable IP addresses and broadcast address for each of the created subnet. (12mks)
- b) Define connection-oriented and connectionless services and explain their three main design approaches used to ensure they deliver data in the network layer. (7 marks)

QUESTION FIVE (25 MARKS)

- a) Distinguish between a LAN and a WAN in terms of infrastructure, coverage, and speed accuracy. (7 marks)
- b) In network management, documentation is a mandatory aspect that a network manager should ensure it is done to ease the management of networks. Discuss any five types of documentation that should be available in any organization. (5 marks)
- c) Discuss any five major application areas of wireless sensor networks (5 marks)
- d) Assuming you have a block of 16 bits to be sent using a checksum of 8 bits, compute the checksum and show how the receiver of data would prove that he has received error free data. The block of data is: 11010110 and 01001110. (8 marks)