



# **MURANG'A UNIVERSITY OF TECHNOLOGY**

## **SCHOOL OF INFORMATION TECHNOLOGY**

### **DEPARTMENT OF INFORMATION TECHNOLOGY**

#### **UNIVERSITY POSTGRADUATE EXAMINATION**

**2021/2022 ACADEMIC YEAR**

#### **FIRSTYEAR FIRSTSEMESTER EXAMINATION FORMASTER OF SCIENCE IN INFORMATION TECHNOLOGY**

**SIT 602– COMMUNICATION NETWORKS 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) As a network design expert, describe with a diagram how the various network components are interrelated and illustrate the functionality of each of the identified component. (10 marks)
- b) Identify and explain any five networking protocols used to enhance communication over computer networks. (5 marks)
- c) Assuming you have a block 16 bits to be sent using 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. (10 marks)

### **QUESTION TWO (25 MARKS)**

- a) You have been tasked to design a network for an organization that has several branches in the continent of Africa. With aid of a diagram, describe the topology that would best fit the organization. (8 marks)
- b) One of the promising computer technologies is use of wireless sensor networks. Explain any three privacy issues associated with the technologies implementation in human bodies. (6 marks)
- c) Computer networks are designed in a highly structured way to reduce their design complexity. This is achieved by designing series of layers of levels for the networks one of the most important design implemented in the current networks is TCP-IP model. Describe the model and state the protocols and network devices used in each layer. (11 marks)

### **QUESTION THREE (25 MARKS)**

- a) 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 networked organization. (10 marks)
- b) As a network engineer, you have determined that LenXerox Company should use a 26 bit Subnet Mask applied to 192.168.0.0/24 network.
  - i) Calculate the possible created subnets (4 marks)
  - ii) Show the range of usable IP address and broadcast address for each of the created subnet. (11 marks)

#### **QUESTION FOUR (25 MARKS)**

- a) Explain the difference between collision domain and broadcast domain. (4 marks)
- b) Explain the three main design approaches used to ensure delivery of data in the network layer for both connection-oriented and connectionless service. (9 marks)
- c) As a consultant in network designs you have been awarded a contract by Murang'a University of Technology to design its network. You have determined to use hierarchical network design model to design the network. With the aid of a diagram, illustrate the design. (12 marks)

#### **QUESTION FIVE (25 MARKS)**

- a) Describe IPV4 addressing schemes stating its limitation. (3 marks)
- b) Identify and explain the two mechanisms implemented to correct errors in data link layer stating the limitation of each approach. (6 marks)
- c) Discuss any five (5) major application areas of wireless sensor networks. (10 marks)
- d) Explain three major multiple access techniques implemented in cellular networks. (6 marks)