



MACHAKOS UNIVERSITY

University Examinations for 2021/2022

SCHOOL OF ENGINEERING AND TECHNOLOGY
DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY
SECOND YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY
SIT271: DATA COMMUNICATIONS AND NETWORKING

DATE: 6/12/2021

TIME: 2.00-4.00 PM

Instruction

Answer question **ONE** and **Any** other **Two** among the four selective questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- a) State four functions of the physical layer (5 marks)
- b) Differentiate between
 - (i) Piggybacking and framing (2 marks)
 - (ii) Transmission Control Protocol and User Datagram Protocol (2 marks)
 - (iii) DNS and DHCP server (2 marks)
- c) A company is granted a site address of 201.70.64.0. The company needs 4 subnets.
 - i. Design the subnets (3 marks)
 - ii. State the range of valid IP addresses in each subnet (2 marks)
- d) Explain three protocols of an IP (6 marks)
- e) Draw TCP/IP model and indicate the key protocols available in each layer (8 marks)

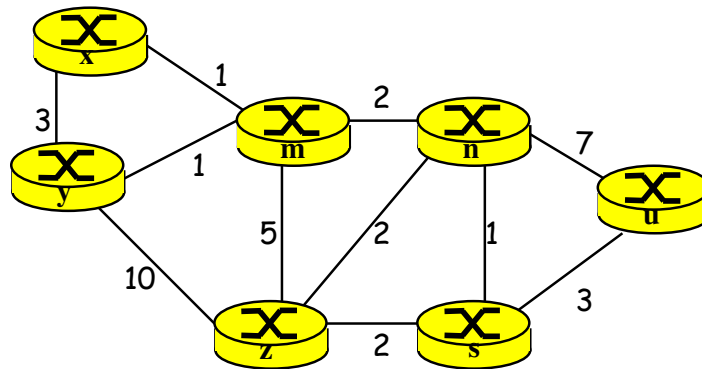
QUESTION TWO (20 MARKS)

- a) A student would like to transmit the message "I LOVE NETWORKS". The message will be represented using ASCII
 - i. Calculate the number of bits of encoded message (6 marks)
 - ii. The actual number of bits transmitted (3 marks)
 - iii. Explain why this result in overhead (2 marks)

- b) Explain the follow functions of data link layer
- Flow control (3 marks)
 - Access control (3 marks)
 - Error Control (3 marks)

QUESTION THREE (20 MARKS)

- a) Consider the network topology shown below. The topology consists of multiple routers interconnected by links. Each link has a static cost associated with it which represents the cost of sending data over that link. Using Dijkstra's shortest-path algorithm. Compute the shortest path from y to all network nodes (show the routing table) (10 marks)



- b) Describe the following functions of the presentation layer
- Compression (2 marks)
 - Translation (2 marks)
 - Encoding (2 marks)
- c) Explain the following classes of signal encoding
- Return to Zero (2 marks)
 - Non Return to Zero (2 marks)

QUESTION FOUR (20 MARKS)

- a) An investor would like to establish a radio station. Advice whether to go for FM or AM, (4 marks)
- b) Using well labelled diagrams, illustrate the communication interfaces in OSI model. (10 marks)
- c) Explain the function of two types of addressing in TCP/IP (6 marks)

QUESTION FIVE (20 MARKS)

- a) Compare and contrast data transmission modes (9 marks)
- b) By use of example, describe CRC (6 marks)
- c) Describe Virtual-Circuit (5 marks)