



MACHAKOS UNIVERSITY

University Examinations for 2020/2021 Academic Year

SUPPLEMENTARY EXAMINATION FOR THE BACHELOR OF COMPUTER SCIENCE

SCO 300: COMPUTER NETWORKS

DATE: MARCH 2021

TIME: 2 HRS

Instructions: Answer Question One and Any Other Two Questions.

Question 1 (30 marks)

- a) Draw the OSI model and state (precisely) the role of each layer. (4 marks)
- b) Describe the difference between circuit switching and packet switching (4 marks)
- c) Explain two measures that help solve the problem of IP address shortage in IPv4. (4 marks)
- d) Explain three differences between TCP and UDP (4 marks)
- e) Explain the three broad classes of media access control (MAC) protocols (6 marks)
- f) Define the following terms:
 - i. Delay
 - ii. Jitter
 - iii. Bandwidth
 - iv. Throughput(4 marks)
- g) Briefly describe the following terms and give examples of each.
 - i. Local Area Network (LAN)
 - ii. Wireless Wide Area Network (WWAN)

- iii. Wireless Metropolitan area network (MAN)
- iv. Personal area network (PAN)

(4 marks)

Question 2 (20 marks)

- a) List three services offered by the transport layer to the other layers.
(3 marks)
- b) Briefly describe TCP three-way handshaking.
(3 marks)
- c) With the aid of a diagram, describe how ports are used for multiplexing in the transport layer.
(4 marks)
- d) List any four known ports.
(4 marks)
- e) Explain four threats to the Machakos University network. Explain four counter-measures to the threats.
(6 marks)

Question 3 (20 marks)

- a) Briefly describe the difference between virtual circuit networks and datagram networks
(4 marks)
- b) With the aid of a diagram, explain the operation of mobile IP
(4 marks)
- c) Explain four advantages of IPv6 over IPv4
(4 marks)
- d) Explain two special IP addresses.
(4 marks)
- e) State four advantages of Network Address Translation (NAT).
(4 marks)

Question 4 (20 marks)

- a) State the hardware device in your computer which hosts the data link layer. Name the address associated with the device. (2 marks)
- b) Explain why it is necessary to have both IP address and MAC address. (2 marks)
- c) Explain three services offered by the data link layer. (6 marks)
- d) Briefly describe the following MAC protocols:
- Token passing
 - Slotted ALOHA
- (6 marks)
- e) With the aid of diagrams, describe the difference between synchronous and asynchronous transmissions. (4 marks)

Question 5 (20 marks)

- a) Briefly explain four protocols found at the application layer. (4 marks)
- b) Explain the meaning of the following terms:
- i. Internet
 - ii. Internet exchange point
 - iii. Sensor network
- (6 marks)
- c) Describe RFID and explain three applications. (4 marks)
- d) Briefly describe the following network devices and state the OSI layer in which they are found.
- i. Router
 - ii. Switch
 - iii. Hub
 - iv. Bridge
- (6 marks)