



MACHAKOS UNIVERSITY

University Examinations for 2019/2020 Academic Year

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

THIRD YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (TELECOMMUNICATION AND INFORMATION TECHNOLOGY)

SPH 316: INFORMATION TECHNOLOGY

DATE: 11/11/2020

TIME: 8.30-10.30 AM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (30 MARKS) COMPULSORY

- a) Explain the importance of the OSI model. (2 marks)
- b) Explain the difference between the network layer and transport layer of the OSI model (2 marks)
- c) State two benefits of network address translation. (2 marks)
- d) Explain the working principle of terrestrial microwave. Use a diagram for illustration. (3 marks)
- e) Distinguish between link state routing and dynamic routing. (3 marks)
- f) With reference to wide area networking, define the following terms:
 - i. Demarcation point
 - ii. Leased line
 - iii. Data terminal equipment
 - iv. Data communicating equipment (4 marks)
- g) Explain the operation of virtual private network (VPN). (2 marks)
- h) Define the following terms:
 - i. Global unicast IPv6 address.
 - ii. Private address space.
 - iii. Link local IPv6 address. (3 marks)

- i) State three differences between a bridge and a switch. (3 marks)
- j) Explain the following MAC protocol types:
 - i. Polling
 - ii. Token passing. (2 marks)
- k) Describe the difference between the following:
 - i. Circuit switching and packet switching
 - ii. Datagram network and virtual circuit network. (4 marks)

QUESTION TWO (20 MARKS)

- a) State the role of the following in the internet architecture:
 - i. Internet exchange point
 - ii. Point of presence
 - iii. Backbone ISP (3 marks)
- b) State three differences between TCP and UDP. (3 marks)
- c) State one example protocol for each of the four layers of the TCP/IP model. (2 marks)
- d) Explain the role of application layer of the OSI model. (4 marks)
- e) State four examples of protocols at the data link layer. (2 marks)
- f) Explain the role of TCP ports in networking. (2 marks)
- g) Define the term multiplexing and discuss two types of multiplexing. (4 marks)

QUESTION THREE (20 MARKS)

- a) Explain the difference between:
 - i. Single mode and multimode fiber
 - ii. Graded index and step index fiber. (3 marks)
- b) Explain three factors to consider when choosing a transmission medium. (3 marks)
- c) With the aid of a diagram, explain the operation of network address translation. (4 marks)
- d) State the role of the following in a network: (2 marks)
- e) State any two features the following Ethernet standards:
 - i. Ethernet
 - ii. Fast Ethernet
 - iii. Gigabit Ethernet (3 marks)
- f) Explain the operation of CSMA/CD. (3 marks)

- g) Every port in a switch is in a separate collision domain and can support full duplex transmission. Explain a scenario that will require CSMA/CD to be used and whether CSMA/CD is still necessary in modern networks. (2 marks)

QUESTION FOUR (20 MARKS)

- a) Define the following WAN terms:
- i. Cell relay
 - ii. Leased line
 - iii. Dial up circuit (3 marks)
- b) With the aid of a diagram, describe the operation of Multiprotocol Label Switching (MPLS). (4 marks)
- c) Write short notes on the following wireless networks:
- i. Bluetooth
 - ii. Wimax (6 marks)
- d) Explain the difference between X.25 and frame relay. (3 marks)
- e) Describe the operation of the following WAN protocols:
- i. Carrier Ethernet.
 - ii. Asynchronous transfer mode (ATM) (4 marks)

QUESTION FIVE (20 MARKS)

- a) Define the following network security terms:
- i. Confidentiality
 - ii. Authentication
 - iii. Integrity
 - iv. Denial of service (4 marks)
- b) Explain four weaknesses of IPv4 that have been addressed by IPv6. (4 marks)
- c) Consider the IPv4 address 172.16.0.0/20 and answer the following questions:
- i. Calculate the number of subnets
 - ii. Calculate the number of hosts per subnet
 - iii. State the subnet mask
 - iv. State the first two subnets and the last two subnets (6 marks)
- d) Explain EUI-64 IP stateless address autoconfiguration (4 marks)