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**TECHNICAL UNIVERSITY OF KENYA**

**FACULTY OF APPLIED SCIENCES AND TECHNOLOGY**

**SCHOOL OF COMPUTING & INFORMATION TECHNOLOGY**

**END OF SEMESTER EXAMINATION SERIES**

**SECOND SEMESTER EXAMINATIONS 2017/2018**

**SECOND YEAR EXAMINATIONS FOR THE DEGREE OF**

**BACHELOR OF TECHNOLOGY IN COMPUTER TECHNOLOGY**

**BACHELOR OF TECHNOLOGY IN INFORMATION TECHNOLOGY**

**BACHELOR OF TECHNOLOGY IN COMMUNICATION AND COMPUTER NETWORKS**

**ECSI 2208/ ECII 2208/ ECCI 2208 DATA COMMUNICATION**

TIME: 2 Hours

**Instructions to candidates:**

This paper consists of FIVE Questions.

Answer Question ONE [30 Marks] and any other TWO Questions [20 Marks Each].

Write your college number on the answer sheet.

This paper consists of 4 printed pages

**Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.**

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# QUESTION ONE (30 MARKS) COMPULSORY

1. Explain the difference between the following OSI model layers:
   1. Data link layer and network layer
   2. Session layer and transport layer

(4 marks)

1. State the private address space for class A, B and C addresses.

(3 marks)

1. Explain the working principle of a fiber optic cable and state two modes of operation.

(3 marks)

1. State two roles of a routing protocol.

(2 marks)

1. Define the following terms:
2. Circuit switched network
3. Packet switched network
4. Virtual circuit network

(3 marks)

1. State four objectives of a network security system.

(2 marks)

1. Explain the use the following special addresses:
2. 127.0.0.1
3. 0.0.0.0
4. 172.16.1.255 255.255.128.0

(3 marks)

1. State three differences between a hub and a switch.

(3 marks)

1. Describe the meaning of the following terms
2. Multiplexing
3. Media access control

(4 marks)

1. Describe the difference between the following:
2. Synchronous and asynchronous transmission
3. Half duplex and full duplex transmission
4. Throughput and bandwidth

(3 marks)

# QUESTION TWO (20 MARKS)

1. Define the term internet.

(2 marks)

1. Describe one application of body area networks.

(3 marks)

1. With the aid of a diagram, describe the difference between the TCP/IP model and the OSI model.

(3 marks)

1. State one example protocol that for each of the four layers of the TCP/IP model.

(2 marks)

1. Describe the difference between the network and the transport layers of the OSI model.

(4 marks)

1. Explain the role of TCP ports in networking.

(2 marks)

1. State any four well known TCP port numbers and their associated protocols.

(2 marks)

1. Explain the operation of the following channel partitioning MAC protocols:
   1. Time division multiple access
   2. Frequency division multiple access

(4 marks)

# QUESTION THREE (20 MARKS)

1. Two Safaricom base stations need a transmission medium to interlink them. The link carries aggregated traffic and the distance between the base stations usually range from hundreds of meters to tens of kilometers.
   1. State two options available

(3 marks)

* 1. State one advantage and one disadvantage of each of the options.

(3 marks)

1. Explain the difference between the following routing protocols classification and state one example protocol for each of the four classifications:
   1. Link state vs distance vector
   2. Interior gateway vs exterior gateway

(4 marks)

1. Explain two advantages of network address translation.

(2 marks)

1. State any two features of the following Ethernet standards:
   1. Ethernet
   2. Fast Ethernet
   3. Gigabit Ethernet

(3 marks)

1. 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)

1. State three main classes of MAC protocols

(3 marks)

# QUESTION FOUR (20 MARKS)

1. State two differences between the following:
   1. Router and switch
   2. Datagram networks and virtual circuit networks

(4 marks)

1. With the aid of a diagram, describe the operation of MPLS.

(4 marks)

1. Write short notes on the following wireless networks:
   1. Bluetooth
   2. Wimax

(6 marks)

1. Explain the difference between leased lines and dial up circuits

(2 marks)

1. Briefly discuss the operation of the following:
   1. MPLS VPN.
   2. DSL

(4 marks)

# QUESTION FIVE (20 MARKS)

1. Explain the difference between a firewall and an intrusion detection system.

(4 marks)

1. State four weaknesses of IPv4 that have been addressed by IPv6.

(4 marks)

1. Explain the operation of a VLAN

(3 marks)

1. Define the following terms:
   1. Unicast
   2. Multicast
   3. Latency
   4. Round trip time

(2 marks)

1. Explain the operation of satellite microwave.

(4 marks)

1. State three factors to consider when choosing a transmission medium

(3 marks)