(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATIONS
YEAR THREE SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE: CSC 373

COURSE TITLE: NETWORK AND SYSTEM
ADMINISTRATION

DATE: 24/11/2022   **TIME: 2.00 P.M – 4.00 P.M**

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSORY) [30 MARKS]

a) Differentiate the following terminologies as used in network design and management

    (i) Physical and Logical topology   **[2 marks]**

    (ii) MAC address and IP address   **[2 marks]**

b) Kibabii University main campus has considered to setup a new computer laboratory for postgraduate students. As a network designer, discuss the four fundamental design goals that should be considered. **[4 marks]**

c) What is a flat network design? Identify the disadvantages of a flat network design.

                                                                 [4 marks]

d) What are the main causes of Network connectivity problems?   **[3 marks]**

e) The first line of defense in network troubleshooting is to use inbuilt operating system tools. Explain each of the listed tools.

    i.   IPCONFIG /all   **[2 marks]**

    ii.   Netstat –a   **[2 marks]**

    iii.   Tracert   **[2 marks]**

f) Explain the checks that can be performed if a user has a problem with network printing. **[3 marks]**

g) As a network design assistant, you have chosen a possible subnet mask for your network and need to determine the number of subnets, number of valid hosts per subnet, valid subnets, broadcast address of each subnet, and valid hosts in each subnet. Calculate each of the listed questions given:

    i.   A subnet mask 255.255.255.128 (/25) and network address 192.168.10.0

                                                                [4 marks]

    ii.   A subnet mask 255.255.255.192 (/20) and network address 172.16.0.0

                                                                [4 marks]

QUESTION TWO [20 MARKS]

a) Define Network media? **[1 mark]**

b) Differentiate between a router and a switch as used in internetworking.

[2 marks]

c) Planning is an integral part of networking. Discuss six (6) key factors to be considered when planning for the transmission media to implement your network. **[6 marks]**

d) Network troubleshooting is an essential part of network management. Explain under what functional area(s) troubleshooting belongs. Explain using a diagram/flow-chart or otherwise the general fault management process provided by Cisco. **[4 marks]**

e) Different applications have different requirements and different protocols have been developed to meet them. Differentiate between jitter and latency. Explain the impact of each in network performance. **[4 marks]**

f) Explain the best hardware and software that can be used in the network to implement the security. **[3 marks]**

QUESTION THREE [20 MARKS]

a) Differentiate between the following terms.
   i. Network availability and network reliability **[2 marks]**
   ii. Bandwidth and Throughput **[2 marks]**

b) Signals travel through transmission media, which are not perfect. The imperfection causes signal impairment. Discuss four (4) types of noise that causes impairment in transmission media. **[8 marks]**

c) One important issue in networking is the performance of the network and how good it is. Calculate the following with regard to network performance:

i. A network with bandwidth of 10 Mbps can pass only an average of 12,000 frames per minute with each frame carrying an average of 10,000 bits. What is the throughput of this network? [2 marks]

ii. What is the propagation time if the distance between the two points is 12,000 km? Assume the propagation speed to be 2.4×10^8 mls in cable. [2 marks]

iii. What are the propagation time and the transmission time for a 2.5-kbyte message (an e-mail) if the bandwidth of the network is 1 Gbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 *mls*. [2 marks]

iv. What are the propagation time and the transmission time for a 5-MB (megabyte) message (an image) if the bandwidth of the network is 1 Mbps? Assume that the distance between the sender and the receiver is 12,000 km and that light travels at 2.4×10^8 m/s. [2 marks]

QUESTION FOUR [20 MARKS]

a) Define each of the following networking terms
   i) Round Trip Time (RTT) [2 marks]
   ii) Response Time [2 marks]
   iii) Stateless Protocol [2 marks]

b) Explain functions of a network operating system. [4 marks]

c) The output below shows the host's IP Address information. Explain the meaning of the three addresses. [4 marks]

Ethernet Adapter Local Area Connection:

Connection-specifi DNS Suffix:

IP Address......: 192.168.1.2

Subnet Mask.....: 255.255.255.0

Default Gateway.....: 192.168.1.254

d) Discuss any six (6) network monitoring tools deemed necessary for computer networks troubleshooting today. **[6 marks]**

QUESTION FIVE [20 MARKS]

a) Differentiate between the following term as used in network administration and system administration

    i.   SMTP and POP3 **[2 marks]**

    ii.   Static and dynamic routing **[2 marks]**

    iii.   Network and system administration **[2 marks]**

b) State giving reasons the type of internet hardware you would most likely use for each of the following tasks:

    i)   Linking a LAN in a building to another LAN in the next building so that data frames can be selectively be forwarded from one LAN to another.

        [2 marks]

    ii)   Linking a LAN in a building to another LAN in a building situated at the other side of a field so that a number of data frames can be exchanged between the LANs. **[2 marks]**

c) In the OSI model, what is the difference between physical and logical addressing?

    [2 marks]

d) Identify and discuss the three top-most principles that guide network and system administrators. **[5 marks]**

e) Define the term DHCP and explain how it is configured. **[3 marks]**