(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR THREE SEMESTER TWO EXAMINATIONS

FOR THE DEGREE OF
BACHELOR OF SCIENCE COMPUTER SCIENCE

COURSE CODE: CSC 373E

COURSE TITLE: NETWORK AND SYSTEM
ADMINISTRATION

DATE: 30/8/2022   **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) 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]**

b) A user complains that their web application Times Out after successfully connecting to a remote host, yet, an investigation with ping indicates the remote host is alive. Propose a cause of this fault and outline a test-strategy that could be used automatically to detect such a fault.

[4 marks]

c) A user would like to infer the path between two hosts; they suggest using the utility ping. Make your argument for why traceroute is the more appropriate utility, comparing and contrasting their operation.   **[4 marks]**

d) Network administration is an IT function that is a priority in the context of the operation of information systems in organizations and modern enterprises. Identify the duties of a network administrator in an organization.   **[4 marks]**

e) KIBU network administrator has chosen a possible subnet mask for his\her 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 for each:

    i.   A subnet mask 255.255.240.0 (/20) and network address 10.0.0.0   **[4 marks]**

    ii.   A subnet mask 255.255.255.192 (/26) and network address 10.0.0.0   **[4 marks]**

f) Consider two clusters A and B each hosting multiple applications. All applications send bursty traffic between A and B over a link E. Under what conditions is circuit switching more efficient to use as opposed to packet switching?   **[4 marks]**

QUESTION TWO [20 MARKS]

a) As a network administrator, explain why it is desirable to use Dynamic Host Control Protocol (DHCP) to assign addresses. **[4 marks]**

b) Differentiate between the following DHCP Message types during client server communication.

    i.   DHCPDISCOVER and DHCPOFFER **[2 marks]**

    ii.   DHCPACK and DHCPNACK **[2 marks]**

    iii. DHCPDECLINE and DHCPRELEASE **[2 marks]**

c) Discuss the lease renewal process in the dynamic assignment of IP addresses. **[8 marks]**

d) Compare the link state and distance-vector protocols in terms of message complexity, processing complexity and robustness. **[6 marks]**

QUESTION THREE [20 MARKS]

a) Differentiate between network monitoring and network management. **[2 marks]**

b) Kibabii University is about to open a new School with three new departments A, B and C. The IPv4 address prefix of the new School is 128.232.1.0/24 and it is expecting each department to have the following number of hosts:

Department A: between 40 and 60 hosts

Department B: between 100 and 120 hosts

Department C: between 20 and 30 hosts

    i.   The university wishes to allocate a subnet for each department. Give possible IPv4 subnet masks for each new department. **[3 marks]**

    ii.   Later, the School opens a fourth department D with 30 hosts. Provide possible IPv4 subnet masks to accommodate all four departments. **[3 marks]**

    iii. Finally, the School opens a fifth department E of similar size to B. Provide possible IPv4 subnet masks to accommodate all five departments. **[4 marks]**

    iv. Are there any practical problems with your answer to Part (c) (iii)? Briefly discuss an alternative solution to accommodate all five departments. **[3 marks]**

c) With SNMP, you can retrieve information about the components operating in the network such as routers, printers, hubs, or even normal computers. Identify any four examples of the type of information that can be retrieved. **[3 marks]**

d) How does SNMP protocol achieve network management function? **[2 marks]**

QUESTION FOUR [20 MARKS]

a) Discuss the following performance metrics

   i.   Throughput   **[2 marks]**

   ii.   Round Trip Time (RTT)   **[2 marks]**

   iii. Packet Loss   **[2 marks]**

b) As a Network and System Administrator, you are to address network authentication and security auditing to detect and prevent network sabotage, abuse and to prevent unauthorized access. How can you achieve this? **[6 marks]**

c) The documentation of the network infrastructure is an essential tool for implementing the various maintenance tasks. Identify what each network documentation file should contain. **[5 marks]**

d) Describe any Three situations that can lead to data loss in any organization. **[3 marks]**

QUESTION FIVE [20 Marks]

a) The Systems Administrator of Acme Company performs the backup of the website database file every day at 15:50. The original file location is /mnt/hda1/www/database.sql. The Administrator copies it to /mnt/sda1/backup/ folder. Provide an automated solution for this problem. Assume that the system is running under Linux and that you have all the necessary tools installed.

[5 marks]

b) A web developer wants to implement a Web server on his personal computer, so that his work is accessible on the internet. Given that the developer has the following:

- *Only one Computer running Windows XP*
- *ADSL connectivity*

The developer wants his web server to run in Linux Environment, but still needs his Windows XP Operating systems for other administrative work.

   i.   Is it possible for the web developer to have two operating systems working simultaneously on his personal computer? Justify your answer. **[3 marks]**

   ii.   Provide the steps the web developer should follow to set up his web server. Your answer should include any software packages used and necessary configurations made.

[9 marks]

iii.	The Web developer notices that his IP changes each time he restarts his Router. Why does this happen? What solution can be provided for this issue?	**[3 marks]**