ZCAS UNIVERSITY

SCHOOL OF COMPUTING AND APPLIED SCIENCES

BACHELOR OF INFORMATION TECHNOLOGY/BACHELOR OF NETWORK ENGINEERING

CCS3632 NETWORK MANAGEMENT AND SUPPORT

MID-SEMESTER EXAMINATION

THURSDAY 23RD OCTOBER 2023

8:30 – 11:30 HOURS

Time allowed: 3 HOURS plus 5 Minutes reading time.

Instructions to Candidates:

1. Read the instructions very carefully.

2. Check that you have the correct examination paper in front of you.

3. There are FIVE (5) questions in this paper. Section A is Compulsory, and you are required to answer ONLY THREE (3) questions from Section B.

4. Begin answering each question on a new page.

DO NOT TURN THIS PAGE UNTIL YOU ARE TOLD TO DO SO.

SECTION A: Question 1 is compulsory and must be attempted

QUESTION 1.

Indo Bank is expanding its clientele base at a very fast rate in Zambia using mobile accounts in cities and rural areas. As a result, there is a requirement for sub-dividing its various networks into other usable networks for convenience and efficiency for its clients.

REQUIRED:

a) For network 200.15.5.0 /29 of Indo Bank's Northern Region:

   i) Find the subnets needed.   **(5 Marks)**

   ii) Determine the ranges of valid IP Addresses for 1st five subnets.   **(10 Marks)**

b) For network 60.0.0.0 with subnet mask 255.224.0.0 of Indo Bank's Central Region:

   i) Determine the number of subnets required.   **(10 Marks)**

   ii) Calculate the number of hosts per subnet.   **(5 Marks)**

   iii) List the 1st five (5) subnets, their first hosts, last hosts, and their Broadcasts.

                                                                      (10 Marks)

                                                          [Total: 40 Marks]

SECTION B: Attempt any THREE questions in this section

QUESTION 2.

You are working as a network administrator for a medium-sized company. The company's computer network is experiencing performance issues, and there are concerns about network security. Your role involves ensuring that the network operates efficiently, securely, and reliably.

Required:
   a) Explain the importance of network management in today's interconnected world.
                                                                      (2 marks)
   b) Identify and describe two key areas of focus within network management that are particularly relevant to your company's goal of operational continuity and reliability.   **(4 Marks)**

c) Provide a brief explanation of how effective network management aligns with your company's business goals, highlighting the benefits of seamless implementation of new services and technologies. (4 marks)

d) Describe the fundamental purpose of SNMP in network management. (4 Marks)

e) Explain the role of ICMP in network management. (6 Marks)

[Total: 20 Marks]

QUESTION 3.

You have recently been appointed as a network administrator for a growing medium-sized company. The company is expanding its network infrastructure and has just opened a new branch office. Your responsibility is to design and configure the network for the new office while ensuring optimal performance, scalability, and security.

Required:

a) Describe the key considerations for selecting a suitable network topology for your company's new branch office and explain how the choice may impact scalability and fault tolerance.

(4 Marks)

b) Explain the significance of Quality of Service (QoS) in network design. (4 Marks)

c) Discuss how the use of VLANs in network design can enhance security, performance, and manageability for your company's growing network. (3 Marks)

d) Explain the purpose of routing protocols, particularly in the context of your company's new Branch Office. (5 Marks)

e) Discuss the significance of network-service configuration in enabling services and list examples of such services. (4 Marks)

[Total: 20 Marks]

QUESTION 4.

You are the network administrator for a medium-sized business. You have noticed that network performance has been degrading recently, affecting user experience. You need to address these issues effectively.

Required:

a) Describe the key aspects of network monitoring as discussed in this module. (3 Marks)

b) Discuss the role of intrusion detection systems (IDS) and intrusion prevention systems (IPS) in network security and how network monitoring contributes to identifying and mitigating security threats. **(5 Marks)**

c) Describe the commonly used network monitoring tools and their specific purposes.

(3 Marks)

d) Describe the role of protocol optimization in network performance tuning, and highlight the techniques used. **(5 Marks)**

e) Describe how network administrators can efficiently address slow network performance issues, highlighting the possible causes and corresponding troubleshooting steps. **(4 Marks)**

[Total: 20 Marks]

QUESTION 5.

Imagine you work as a network administrator in a medium-sized financial institution. Your organization manages a complex network infrastructure that connects multiple branches and provides online banking services to thousands of customers. Security is paramount in the financial sector, given the sensitive customer data and financial transactions that are processed daily.

Recently, your organization experienced a cybersecurity incident. Several customers reported unauthorized transactions and suspicious account access. This incident raised concerns about the overall network security and prompted a review of your organization's cybersecurity measures.

As part of your responsibilities, you are tasked with enhancing network security and cybersecurity practices to prevent such incidents in the future. You'll need to implement a combination of technical controls, policies, and user awareness initiatives to mitigate risks and respond to threats effectively.

Required:

a) Describe five layers of cybersecurity and explain the focus of each layer.

(6 Marks)

b) Mention three cybersecurity frameworks and provide a brief overview of each.

(5 Marks)

c) Explain why compliance with data protection regulations and ethical considerations are essential in cybersecurity practices. **(3 Marks)**

d) List and briefly describe three key components of network security. (3 Marks)

e) Discuss the concept of network segmentation and show its importance in networking.

(3 Marks)

[Total: 20 Marks]

END OF MID SEMESTER EXAMINATION