



Strathmore
UNIVERSITY

SCHOOL OF COMPUTING AND ENGINEERING SCIENCES
BACHELOR OF SCIENCE IN COMPUTER NETWORKS AND CYBER SECURITY
END OF SEMESTER EXAMINATION
CNS 1203 INTRODUCTION TO COMPUTER NETWORKS

DATE: 8th March 2024

Time: 10:30-12:30 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

QUESTION ONE (THIRTY MARKS)

- a) Explain the purpose of the link layer in network communication and its interaction with upper-layer protocols. **(6 Marks)**
- b) Discuss the concept of scalability in computer networks. What are the different types of scalabilities, and how can they be implemented **(6 marks)**
- c) Compare and contrast IPv4 and IPv6, highlighting the reasons for the transition to IPv6. **(6 Marks)**
- d) Classify the following IP addresses in class A, B, C, D or E **(6 marks)**
 - i. 10.2.28.1
 - ii. 192.168.1.100
 - iii. 168.10.1.150
 - iv. 127.0.0.0
 - v. 28.2.100.20
 - vi. 200.55.1.100
- e) Discuss the main characteristics of "Wide Area Networks (WANs)" and how they differ from Local Area Networks. **(6 Marks)**

QUESTION TWO (TWENTY MARKS)

- a) Contrast the OSI model with the TCP/IP reference model using a diagram to show the correspondence between relevant protocol layers in the two models. **(4 Marks)**
- b) Explain the concept of encapsulation and its role in computer networks. **(4 Marks)**
- c) A company is granted a site address 201.70.64.0. The company needs six subnets. Design the subnets. **(7 Marks)**
- d) Briefly explain how the Domain Name Service (DNS) is implemented and how DNS queries are resolved in the DNS system. **(5 Marks)**

QUESTION THREE (TWENTY MARKS)

- a) Describe any four (4) protocols that reside in the TCP/IP application layer. **(4 Marks)**
- b) Discuss the differences between TCP and UDP and their suitability for specific applications. **(6 Marks)**
- c) Discuss the principles of network security and the challenges associated with securing modern computer networks. **(6 Marks)**
- d) You have been selected as a network security expert for **Mambotatu** company. Investigate a notable network security breach, outlining the vulnerabilities exploited and the lessons learned for network administrators. **(4 Marks)**

QUESTION FOUR (TWENTY MARKS)

- a) Distinguish the following:
 - i. IP address and MAC address **(2 Marks)**
 - ii. Half duplex and Full duplex modes. **(2 Marks)**
- b) Explain the functionalities of common network devices such as firewalls, routers, switches, and gateways. **(8 Marks)**

- c) With the aid of a diagram, explain how data changes when two hosts communicate via SMTP protocol. **(8 Marks)**

QUESTION FIVE (TWENTY MARKS)

- a) Which two protocols are used to map from Internet resource names, such as www.strathmore.edu, to the address of individual network ports that a connected computer uses for network communication? **(2 marks)**
- b) How does the mapping process in part a) above differ when the data-link protocol used is ATM rather than Ethernet? **(2 marks)**
- c) A local network has several interconnected wired Ethernet switches. One switch blows a fuse and is powered down. What happens to the network when the switch fails? **(1 mark)**
- d) A new switch is bought. What must the network technicians do to install the new switch and make it work as a replacement for the failed device? Is this easy or hard to do? Why is it easy or hard? **(4 marks)**
- e) Why do network collisions seldom (never) occur on modern wired networks whereas they are common on many wireless networks? **(4 marks)**
- f) Briefly explain how wireless networking systems can avoid collisions where possible? **(7 marks)**