



JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF INFORMATICS AND INNOVATIVE SYSTEMS

**UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR SCIENCE IN
BUSINESS INFORMATION SYSTEMS**

2nd YEAR 2nd SEMESTER 2024/2025 ACADEMIC YEAR

MAIN CAMPUS

COURSE CODE: ITB 2204

COURSE TITLE: INFORMATION SYSTEMS AND NETWORKING LAB

EXAM VENUE: CL-2

STREAM:

DATE: 16/4/2025

EXAM SESSION: 9.00-11.00

TIME: 2.00 HOURS

INSTRUCTIONS:

- 1. Answer Question 1 (Compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on the question paper**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room**

SECTION A

1. What is the function of a Multiprotocol Label Switching (MPLS) network? **2marks**
2. Explain the primary function of a switch and how it differs from a hub. **(2 Marks)**
3. Explain the difference between connection-oriented and connectionless communication in networking. **(2 marks)**
4. Describe the three steps involved in a TCP three-way handshake. **(2 marks)**
5. What is the function of the Internet Protocol (IP), and at which OSI layer does it operate? **(2 marks)**
6. Compare the roles of TCP and UDP in data transmission. **(2 marks)**
7. What is the function of the Domain Name System (DNS), and what problem does it solve? **(2 marks)**
8. A user complains that they are unable to access a website using its domain name, but when they type the IP address directly, the site loads fine. What troubleshooting steps would you take to identify and resolve the issue? **(3 marks)**
9. Explain how DHCP dynamically assigns IP addresses to devices. What are the advantages of using DHCP compared to static IP addressing? **(3 marks)**
10. Differentiate between a LAN and a Wide Area Network (WAN) with one example for each. **(3 marks)**
11. Explain the concept of a peer-to-peer network and mention one advantage and one disadvantage of using it. **(3 marks)**
12. What are VLANs, and how do they enhance network security and performance? **(3 marks)**
13. How does a router determine the next hop for forwarding a data packet? **(1 Marks)**

SECTION B

QUESTION ONE

- a) Compare and contrast bus topology and star topology, highlighting two advantages and two disadvantages of each. **(5 marks)**
- b) Explain what VLANs are and describe two benefits of using VLANs in a network. **(5 marks)**
- c) A multinational corporation is planning to expand its offices across multiple cities and needs a reliable, secure, and scalable networking solution. As a network specialist, recommend and justify the most suitable network topology and architecture for their needs. **(5 marks)**
- d) A media streaming service is experiencing high latency and buffering issues due to congestion on its network. The service currently relies on TCP for data transmission. Suggest an alternative protocol, justify your choice, and explain how this change would improve performance. **(5 marks)**

QUESTION TWO

- a) Your organization has the IP address range **192.168.1.0/24** and wants to create six subnets.
- I. What subnet mask should be used to achieve this? **(2 marks)**
 - II. How many usable host addresses will each subnet have? **(2 marks)**
- b) A small business uses private IP addresses **192.168.10.0/24** but needs to allow multiple devices to access the internet using a single public IP address.
- I. What type of NAT should be used? **(2 marks)**
 - II. Explain how this NAT process enables internet access for multiple internal devices. **(2 marks)**
- c) A user reports that they are unable to access the internet. You check their IP address and find that it is **169.254.5.12**.
- I. What does this IP address indicate? **(1 mark)**
 - II. What steps would you take to resolve this issue? **(2 marks)**
- d) Your ISP assigns you the IP address **198.51.100.0/27**.
- I. How many subnets are available in this allocation? **(2 marks)**

- II. How many usable host addresses does each subnet have? **(2 marks)**
- e) A company is moving from IPv4 to IPv6 to support network growth.
- I. Identify two benefits of using IPv6 over IPv4. **(2 marks)**
- II. What does an IPv6 **link-local address** do? **(1 mark)**

QUESTION THREE

- a) Describe the OSI model and explain the function of any three layers, providing real-world examples for each. **(5 marks)**
- b) A company is experiencing frequent cyber-attacks. Suggest **two security measures** to protect the network and explain how each would help prevent security breaches. **(5 marks)**
- c) Differentiate between **IPv4 and IPv6** in terms of addressing format and efficiency. Why is IPv6 considered an improvement over IPv4? **(5 marks)**
- d) A business needs to provide **secure remote access** for its employees working from home. Explain how a **VPN** can be used and describe the steps to set it up securely. **(5 marks)**

QUESTION FOUR

- a) Bridges were widely used in early networks but have largely been replaced by switches. Analyze the reasons for this transition and explain the similarities and differences between bridges and switches in handling network traffic. **(4 Marks)**
- b) Define full-duplex communication and explain how switches improve network performance compared to hubs. **(4Marks)**
- c) What is the function of a proxy server in a network, and how does caching improve network efficiency? **(4 Marks)**
- d) Describe the function of a firewall and how it controls network access. **(4 Marks)**
- e) Describe the difference between an active hub and a passive hub. **(4 Marks)**

QUESTION FIVE

- a) An online banking platform wants to enhance the security of customer transactions by encrypting data during communication between clients and servers. Recommend a suitable protocol, explain how it works, and discuss additional security measures that should be implemented alongside it. **(5 marks)**

- b) A company has multiple branch offices that need to securely exchange sensitive data over the internet. Currently, they are using FTP to transfer files. Identify a more secure alternative, explain how it improves security, and describe the steps required to implement it. **(5 marks)**
- c) Explain how the TCP three-way handshake process establishes a reliable connection and why this is crucial for data integrity in networking. **(3 marks)**
- d) Differentiate between connection-oriented and connectionless protocols. Provide an example of each and explain how their differences impact network performance. **(3 marks)**
- e) What is the primary purpose of the File Transfer Protocol (FTP), and how does it differ from SFTP? **(2 marks)**
- f) How does Secure Shell (SSH) enhance security compared to Telnet? **(2 marks)**

JUST OBSERVES ZERO TOLERANCE TO EXAM CHEATING