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UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE
IN COMPUTER SCIENCE**

COSC 260: DATA COMMUNICATION

STREAMS: BSC COMP. SC (ODEL)

TIME: 2 HOURS

DAY/DATE: FRIDAY 08/08/2025

11.30 A.M. – 1.30 P.M.

INSTRUCTIONS

- Answer question **ONE** [**Compulsory**] and any other **TWO** questions.
- Do not write anything on the question paper

Question One (30 Marks)

- Define data communication. (2 marks)
- Explain **FOUR** fundamental components that make telecommunication networks function effectively in modern digital systems. (4 marks)
- Distinguish between the following transmission concepts, providing one practical application for each:
 - Bit rate and Baud rate (4 marks)
 - Synchronous and Asynchronous transmission (4 marks)
- Explain the role of modulation and demodulation in data communication systems. Why are these processes essential for long-distance data transmission? (5 marks)
- The OSI model and TCP/IP model are fundamental communication architectures.
 - List the seven layers of the OSI model (4 marks)
 - Explain how the TCP/IP model differs from the OSI model (3 marks)
- Describe **TWO** methods used for error detection in data communication and explain why error detection is crucial in network communications. (4 marks)

Question Two (20 Marks)

- a) Network switching techniques determine how data moves through networks. Distinguish between circuit switching, message switching, and packet switching. Explain **TWO** advantages and **TWO** disadvantages of packet switching over circuit switching. (10 marks)
- b) Network architectures and topologies define how network components are organized. Describe **THREE** common network topologies, providing **one** advantage and **one** disadvantage for each. (10 marks)

Question Three (20 Marks)

- a) Flow control mechanisms are essential for reliable data communication.
- i) Explain the Stop-and-Wait protocol and describe how it ensures reliable data transmission (5 marks)
 - ii) Compare Stop-and-Wait protocol with Sliding Window protocols, highlighting the advantages of sliding window approach (5 marks)
- b) Network switching techniques determine how data moves through networks.
- i) Distinguish between circuit switching, message switching, and packet switching (6 marks)
 - ii) Explain **TWO** advantages and **TWO** disadvantages of packet switching over circuit switching (4 marks)

Question Four (20 Marks)

- a) Network architectures and topologies define how network components are organized.
- i) Describe **FOUR** common network topologies, providing one advantage and one disadvantage for each (8 marks)
 - ii) Explain the concept of Point-to-Point protocols and their role in network communication (4 marks)
- b) Security threats and telecommunications management are critical aspects of modern networks.
- i) Identify and explain **FOUR** common security threats in telecommunication networks (4 marks)
 - ii) Describe **TWO** strategies that network administrators can implement to manage and mitigate these security threats (4 marks)

Question Five (20 Marks)

a) Signal encoding is fundamental to digital communication systems.

- i) Explain what signal encoding means and why it's necessary in data communication (3 marks)
- ii) Describe **THREE** different signal encoding techniques used in digital communication (6 marks)

b) Communication protocols ensure standardized data exchange between network devices.

- i) Define what a communication protocol is and explain its importance in network communication (3 marks)
- ii) Compare serial and parallel transmission modes, explaining when each would be most appropriate (4 marks)
- iii) Explain how error correction differs from error detection, providing one example of each (4 marks)

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