

CHUKA

UNIVERSITY



UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN COMPUTER SCIENCE

COSC 00108: INTRODUCTION TO DIGITAL LOGIC AND DATA COMMUNICATIONS

STREAMS: CERT. COMP. SC.

TIME: 2 HOURS

DAY/DATE: TUESDAY 05/08/2025

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

- Answer question **ONE** and **TWO** other questions.

SECTION A (Answer **ALL** questions in this section)

QUESTION ONE (30 Marks)

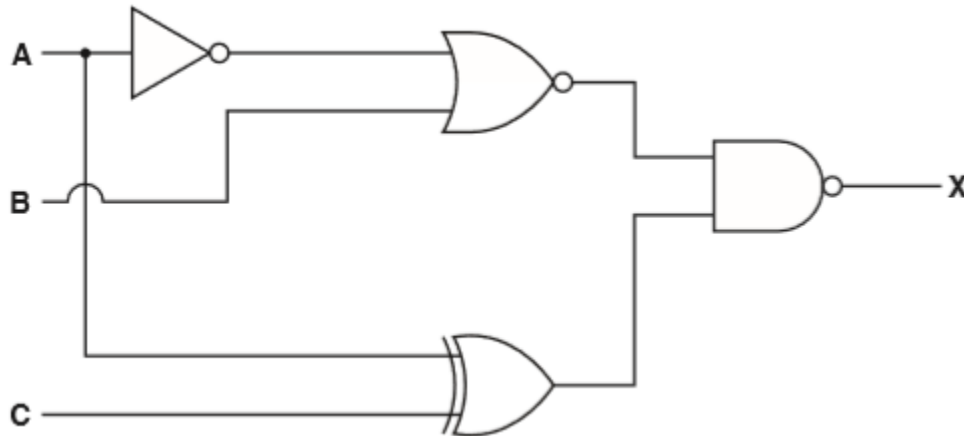
- Explain the following terms:
 - Point-to-point configuration [2 marks]
 - Unguided medium [2 marks]
 - Transistor [2 marks]
 - Universal gate [2 marks]
- Briefly discuss the serial mode of transmission. [4 Marks]
- Flow control aims to ensure that the sending entity does not overwhelm the receiving entity.
With the aid of a diagram, explain Stop-and-Wait Flow Control [4 Marks]
- Using **NAND** gates only, draw a logic circuit for the following logic expression
 $(A + B)(B + C)$ [4 marks]
- Explain any **FOUR** factors to consider when selecting a transmission medium. [4 marks]
- Draw the truth table and the logic circuit diagram for a 3 input XOR gate. [6 Marks]

SECTION B (Answer any TWO questions)**QUESTION TWO (20 Marks)**

- Discuss the TWO types of parity check error detection technique [6 marks]
- Using a truth table show that $AB = (A+B)(A+B')(A'+B)$ [8 Marks]
- Briefly discuss any THREE wireless transmission impairments. [6 marks]

QUESTION THREE (20 Marks)

- List THREE causes of errors on a communication line. [3 marks]
- What is the function of an ACK in the stop-and-wait error control? [5Marks]
- Below is a circuit diagram, use it to deduce the truth table of the output 'X' [12 marks]

**QUESTION FOUR (20 Marks)**

- Draw the truth tables and logic symbols of the following logic gates.
 - XOR gate [4 Marks]
 - NOT gate [2 Marks]
 - OR gate [2 marks]
- Briefly discuss how checksum is used to detect errors during transmission from a sender to the receiver. [6 Marks]
- Explain the following transmission modes in data communication, and give appropriate examples in each case
 - Simplex [2 Marks]
 - Half- duplex [2 Marks]

iii. Full – duplex

[2 Marks]

QUESTION FIVE (20 Marks)

- a. Draw a logic circuit to represent the logic statement: $X = 1$ if (A is NOT 1 AND B is 1) AND (A is NOT 1 AND C is NOT 1) OR B is 1 AND C is 1). [10 marks]
- b. With the aid of a diagram, differentiate between parallel and serial transmission modes [6 Marks]
- c. Give TWO examples of common wireless systems that are used for communications [4 Marks]

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