

CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF CERTIFICATE IN COMPUTER
SCIENCE**

COSC 00108: INTRODUCTION TO DIGITAL LOGIC AND DATA COMMUNICATION

STREAMS: CERT. COMP SCI.

TIME: 2 HOURS

DAY/DATE: TUESDAY 21/09/2021

2.30 P.M. – 4.30 P.M.

INSTRUCTIONS:

- Answer question **ONE** and **TWO** other questions
- Do not write anything on the question paper
- This is a **closed book exam**, no reference materials are allowed in the examination room
- There will be **NO** use of mobile phones or any other unauthorized materials
- Write your answers legibly and use your time wisely.

SECTION A**Question one (30 marks)**

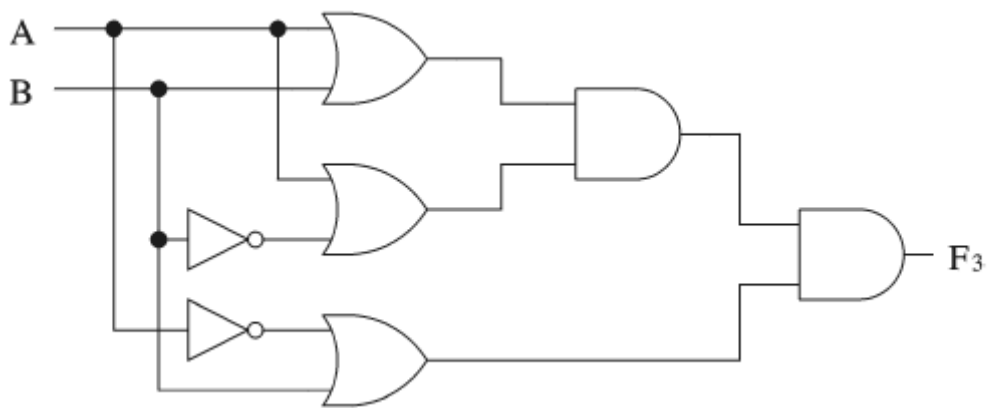
- a. Describe the work done by the following electronic components in a circuit.
 - i. Resistor [2 marks]
 - ii. Diode [2 marks]
- b. Give four differences between analog signal and digital signal [4 marks]
- c. Distinguish between asynchronous transmission and synchronous transmission [4 marks]
- d. Briefly discuss how checksum is used to detect errors [5 marks]
- e. Draw a logic circuit for the following logic expression $A B + B C + A C$ [6 marks]
- f. Using a truth table show that $XZ = (X+Y)(X+Y')(X'+Z)$ [7 marks]

SECTION B

Question Two (20 marks)

- a. Draw the truth tables of the following logic gates.
 - i. NAND [2 marks]
 - ii. NOR [2 marks]
 - iii. NOT [2 marks]
- b. Write down intermediate logical expressions along the path of the circuit below. [10

marks]



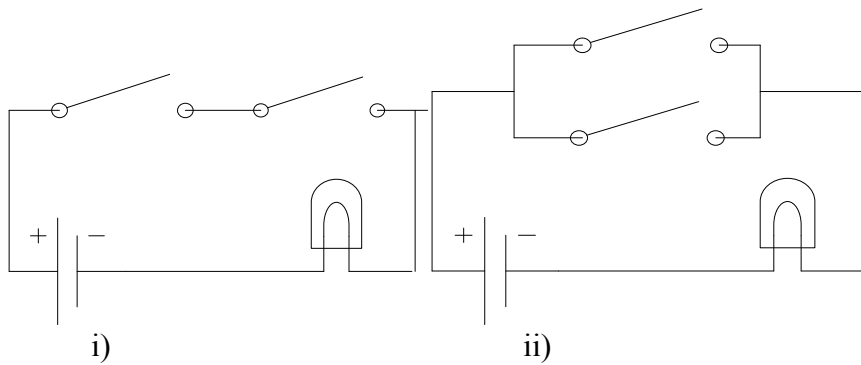
- c. Differentiate between half duplex and full duplex modes of data transmission [4
- marks]

Question three (20 marks)

- a. Draw the logic circuit for the following boolean expression. Do not manipulate the algebra. $F = [A(\overline{B+C}) + BDE](\overline{A} + CE)$ [12 marks]
- b. Explain four causes of errors on a transmission medium [8 marks]

Question four (20 marks)

- a. Give corresponding logic gates and a truth table that represent the following electronic circuits. [6 marks]



- b. Construct truth table for the following expression $(X+Y) (X+Z) (\bar{X}+Z)$ [8 marks]
 c. The transmission mode decides how data is transmitted between two computers. Using a diagram, discuss the 2 modes of transmission. [6 marks]

Question five (20 marks)

- a. Distinguish between combinational circuits and sequential circuits [4 marks]
 b. Explain five components used in data communication [10 marks]
 c. Discuss the following characteristics that determine the effectiveness of any data communication system.
 i. Delivery [2 marks]
 ii. Accuracy [2 marks]
 d. Transmission medium can either be guided or unguided, name two guided transmission medium used in data communication [2 marks]

