



**MASINDE MULIRO UNIVERSITY OF
SCIENCE AND TECHNOLOGY
(MMUST)
MAIN CAMPUS**

**UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR**

**SECOND YEAR SECOND SEMESTER EXAMINATIONS
FOR THE DIPLOMA
IN
INFORMATION TECHNOLOGY**

COURSE CODE: DIT 079

COURSE TITLE: DIGITAL ELECTRONICS

DATE: 18/04/2023

TIME: 2:00-4:00PM

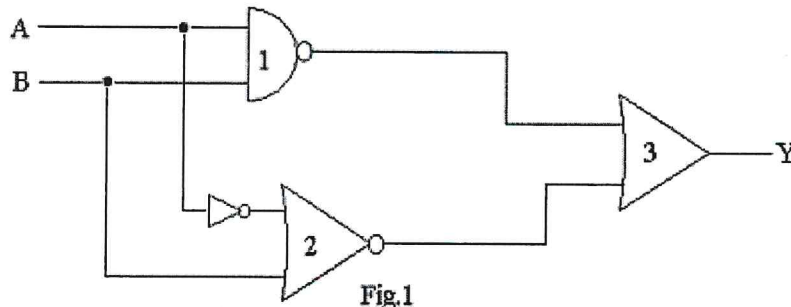
INSTRUCTIONS TO CANDIDATES

- Answer Questions ONE and ANY OTHER TWO.

TIME: 2 Hours

QUESTION ONE (24 MARKS) COMPULSORY

- a. Find the Boolean expression for logic circuit shown in Fig.1 below and reduce it using Boolean algebra. **6 Marks**



b.

- c. Convert the octal number 7401 to Binary. **3 Marks**
 d. Find the hex sum of $DE_{16} + 93_{16}$ **3 Marks**
 e. Using NOR gates only, produce **7 Marks**
 i. NOT gate
 ii. AND gate
 iii. OR gate
 f. Prove the following equations using the Boolean algebraic theorems. **5 Marks**

(i) $A + \bar{A}.B + A .\bar{B} = \bar{A} + B$ (ii) $\bar{\bar{A}}BC + A\bar{B}C + AB\bar{C} + ABC = AB + BC + AC$

QUESTION TWO (18 MARKS)

- a. Perform 2's complement subtraction of $(7)_{10} - (11)_{10}$. **3 Marks**
 b. Determine the binary numbers represented by the following decimal numbers. **6 Marks**
 (i) 25.5
 (ii) 10.625
 (iii) 0.6875
 c. Prove the following Boolean identities. **5 Marks**
 (i) $XY + YZ + \bar{Y}Z = XY + Z$
 (ii) $A.B + \bar{A}.B + \bar{A}.\bar{B} = \bar{A} + B$
 d. State and demonstrate De Morgan's Theorems. **4 Marks**

QUESTION THREE (18 MARKS)

- a. Use 3 input variable circuit diagrams and truth tables to demonstrate an AND & OR functions. **8 Marks**
 b. Using NAND gates only, produce **7 Marks**

- i. NOT gate
 - ii. AND gate
 - iii. OR gate
- c. Convert the decimal number 45678 to its hexadecimal equivalent number. **3 Marks**

QUESTION FOUR (18 MARKS)

- a. What are universal gates? **2 Marks**
- b. Construct a logic circuit using NAND gates only for the expression $x = A \cdot (B + C)$. **5 Marks**
- c. With relevant logic diagram and truth table explain the working of a two input EX-OR gate. **7 Marks**
- d. Distinguish between Minterms and Maxterms **4 Marks**

QUESTION FIVE (18 MARKS)

- a. Using truth table and logic circuit diagram, demonstrate a circuit for half adder **5 Marks**
- b. Implement the above half adder circuit using NAND gates only **5 Marks**
- c. Convert $(177.25)_{10}$ to octal. **4 Marks**
- d. Explain the following laws of Boolean algebra. **4 Marks**
 - i. Commutative laws.
 - ii. Associative laws.

