



# **NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY**

**FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION**

**DIGITAL ELECTRONICS**

**PTE2254**

**MAIN Second Semester Examination Paper**

**May 2019**

This examination paper consists of 4 pages

**Time allowed: 3 hours**

**Total Marks: 100**

**Special requirements: NONE**

**Examiner's name: Mrs D. Chasokela**

## **INSTRUCTIONS**

1. The paper has 4 printed pages.
2. Each question carries 25 marks.
3. Answer question 1 and any 3 questions.
4. Start your answer for each question on a fresh page.

## **MARK ALLOCATION**

<b>QUESTION</b>	<b>MARKS</b>
1.	25
2.	25
3	25
4.	25
5.	25
<b>TOTAL</b>	<b>100</b>

### QUESTION 1

(a) Represent an XOR gate using symbol, truth table and equivalent circuit diagram.

[9 marks]

(b) Convert the following:

(i) $133_8$ to decimal equivalent	(ii) $91_{10}$ to octal equivalent
(iii) $24,6_8$ to decimal equivalent	(iv) $423_{10}$ to Hex equivalent
(v) Hex $9F2_{16}$ to binary equivalent	$10111101_2$ to octal equivalent
$21,125_{10}$ to binary equivalent	$37_{10}$ to binary equivalent
$10111_2 + 10010_2$	$10111_2 \times 101_2$
$0,0011_2 + 0,1110_2$	$1110_2 \times 111_2$
$101011_2 - 10010_2$	$11001_2 \div 101_2$
$1101_2 - 1011_2$	$1110011_2 \div 101_2$

[16 marks]

### QUESTION 2

Illustrate a BCD 7 segment decoder using a block diagram and a truth table.

[25 marks]

### QUESTION 3

(a)  $A \oplus B = A \overline{B} + \overline{A} B$

[5 marks]

(b)  $(A+B)(A+C) = A+BC$

[5 marks]

(c) Draw a logic circuit to implement the expression  $X = A B + \overline{B} C$

[5 marks]

(d) Represent logic 0 and 1 in possible states of a circuit.

[10 marks]

#### QUESTION 4

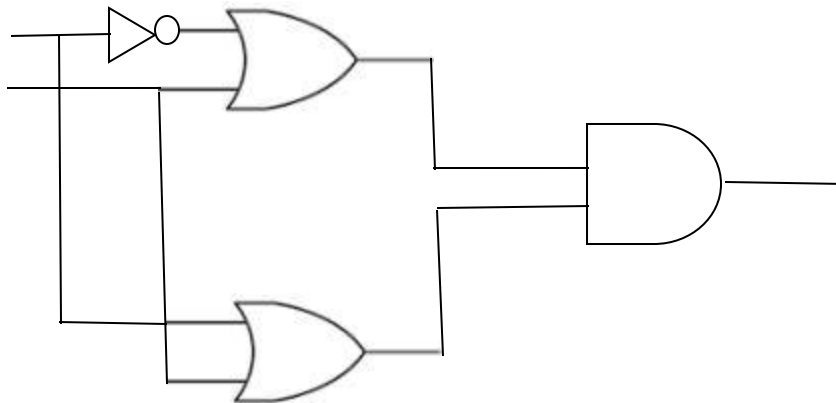
(a) A truth table with variables ABC and output D has output 0, 0,1 ,1 ,0 ,1 ,0 ,1. Create a truth table and represent the Boolean equation using a Karnaugh Map. [10 marks]

(b) Simplify the following in Boolean form:

(i)  $Y = \overline{[(\overline{A + B}) \cdot C \cdot D]}$  [5 marks]

(ii)  $Y = A B \overline{C} + A \overline{B} C$  [5 marks]

(iii)



[5 marks]

#### QUESTION 5

Draw and explain an SR Latch flip flop.

[25 marks]

END OF EXAMINATION