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(Knowledge for Development)

KIBABII UNIVERSITY

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UNIVERSITY EXAMINATIONS

2019/2020 ACADEMIC YEAR

MAIN EXAMINATIONS

YEAR TWO SEMESTER TWO EXAMINATIONS

**FOR THE DIPLOMA IN INFORMATION
TECHNOLOGY**

COURSE CODE : DIT 079

COURSE TITLE : DIGITAL ELECTRONICS

DATE: 11/11/2020 TIME: 2.00 P.M. -5.00 P.M.

INSTRUCTIONS TO CANDIDATES

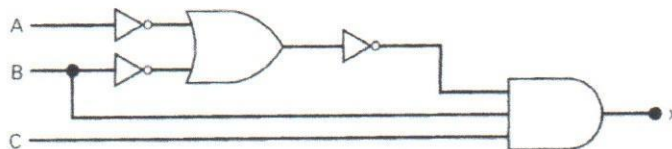
ANSWER QUESTION ONE AND ANY OTHER TWO

QUESTION ONE [COMPULSORY] [24 MARKS]

- (a) Define the following terms with examples [4 MARKS]
- i. Logic circuits
 - ii. Digital integrated circuits
- (b) Storage devices like CD/DVD, Hard Drive and USB Drive are considered to be digital drives although technology used differs. Explain the allegation. [6 MARKS]
- (c) Convert the following into decimal number system [6 MARKS]
- i. 1011.101_2
 - ii. 4057.06_8
 - iii. $5C7_{16}$
- (d) Draw a logic-circuit directly from the expression [4 MARKS]
- $$Y = AC + B\bar{C} + \bar{A}BC$$
- (e) Complete each expression [4 MARKS]
- i. $D+0=$
 - ii. $B \cdot \bar{B}=$
 - iii. $G+GF=$
 - iv. $Y+\bar{W}Y=$

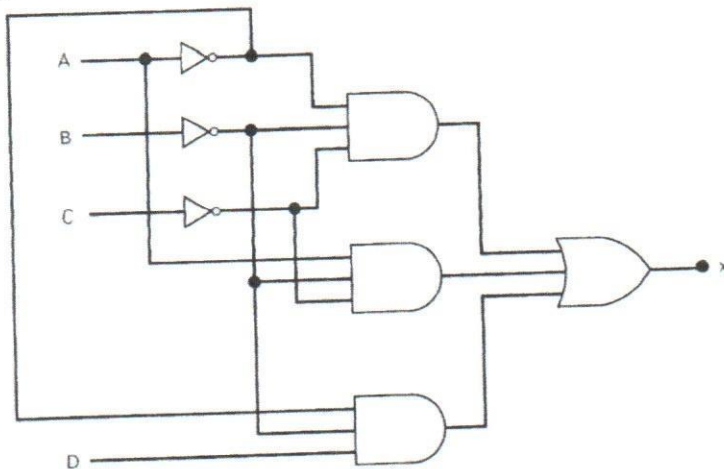
QUESTION TWO [18 MARKS]

- (a) Using relevant examples, discuss how digital systems outshines analog systems [6 MARKS]
- (b) Sort the following devices into analog, digital or hybrid systems [4 MARKS]
- Ten-position switch
 - Current-flowing out of an electrical outlet
 - Sand grains on the beach
 - Automobile speedometer
- (c) Convert the following number to its equivalent hexadecimal number. [4 MARKS]
- i. 125.201_{10}
 - ii. 1110100.0100111_2
- (d) Write the Boolean expression for output x in the figure below. Determine the value of x for all possible conditions using a truth table [4 MARKS]



QUESTION THREE [18 MARKS]

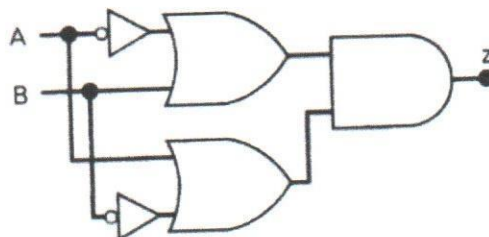
- (a) Define the following terms [4 MARKS]
 i. Boolean Algebra
 ii. Truth table
- (b) Elaborate the output of the THREE basic logic gates with the help of a diagram and truth table. [6 MARKS]
- (c) Using Boolean algebra techniques, simplify this expression: [4 MARKS]
 $f = AB + A(B+C) + B(B+C)$
- (d) Write the Boolean expression for output x in the figures below. Determine the value of x for all possible conditions using a truth table. [4 MARKS]



QUESTION FOUR [18 MARKS]

- (a) Explain how knowledge of logics gates are useful in industrial control systems? [4 MARKS]
- (b) For each of the following expression, construct the corresponding logic circuit, using AND and OR gates and INVERTERS. [6 MARKS]
 i. $x = AB(C + D)$
 ii. $z = \overline{(A + B + \overline{CDE})} + \overline{BCD}$
 iii. $y = \overline{(M + N + \overline{P}Q)}$

(c) Simplify the circuit



QUESTION FIVE [18 MARKS]

- (d) Identify and elaborate how digital systems are going to shape the future. [6 MARKS]
(e) State DeMorgan's theorems. [2 MARKS]
(f) Simplify each of the following expressions using DeMorgans theorems [10 MARKS]

i. \overline{ABC}

ii. $\overline{A + B}$

iii. $\overline{A(B + \overline{C})D}$

iv. $\overline{\overline{A} + \overline{BC}}$

v. $\overline{\overline{AB}}$