(*Knowledge for Development*)

KIBABII UNIVERSITY

(KIBU)

UNIVERSITY EXAMINATIONS
2019/2020 ACADEMIC YEAR

SPECIAL/SUPPLEMENTARY EXAMINATION

YEAR TWO SEMESTER TWO

FOR THE DIPLOMA
INFORMATION TECHNOLOGY

COURSE CODE : DIT 079

COURSE TITLE : DIGITAL ELECTRONICS

DATE: 17/02/2021 **TIME:** 2.00 P.M – 4.00 P.M.

INSTRUCTIONS

ANSWER QUESTIONS ONE AND ANY OTHERTWO.

QUESTION ONE (COMPULSORY) [24 MARKS]

a) Categorize the different ways of representing numerical values of quantities. **[2 marks]**

b) Define the term digital quantity hence state an example. **[3 marks]**

c) Name the different number systems used in digital technology. **[4 marks]**

d) Outline the different basic logic gates **[3 marks]**

e) Utilizing boolean algebra, solve the following boolean expression

$F = C\,(B + C)\,(A + B + C)$ **[5 marks]**

f) Differentiate between a latch and a flip flop. **[2 marks]**

g) Distinguish between Minterms and Maxterms **[2 marks]**

h) List the main categories of sequential circuits. **[3 marks]**

QUESTION TWO [18 MARKS]

a) Define the term universal gates **[2 marks]**

b) List the universal gates **[2 marks]**

c) Draw a NOR gate and its truth table **[3 marks]**

d) Outline the De Morgan's theorems hence prove them using truth table method. **[6 marks]**

$\overline{(A\,B)} = \overline{A} + \overline{B}$

e) Apply De Morgan's theorem to equate $A(B + C)$ **[2 marks]**

Create a logic circuit using NAND gates only for the expression

$X = A\,(B + C)$ **[3 marks]**

QUESTION THREE [18 MARKS]

a) What is a shift register? **[2 marks]**

b) Outline the basic types of registers **[4 marks]**

c) State three applications of shift registers **[3 marks]**

d) List the different types of counters and briefly explain how each of them works **[9 marks]**

QUESTION FOUR [18 MARKS]

a) Contrast between combinational logic circuits and sequential logic circuits clearly stating all the differences with respect to their output, memory and fundamental building block **[6 marks]**

b) Design a JK flip flop using a D flip flop **[12 marks]**

QUESTION FIVE [18 MARKS]

a) With the help of a diagram, explain hence illustrate what you understand by the term "Don't care terms". **[4 marks]**

b) State five main reasons for simplifying Boolean functions. **[5 marks]**

c) Contrast between a standard Sum Of Products (SOP) and a standard

d) (i) What is the function of a Karnaugh map. **[2 marks]**

(ii) State the various kinds of Karnaugh maps **[3 marks]**

Outline two different techniques used for simplifying boolean equations **[2 marks]**