(Knowledge for Development)

KIBABII UNIVERSITY
(KIBU)

UNIVERSITY EXAMINATIONS
2021/2022 ACADEMIC YEAR

END OF SEMESTER EXAMINATIONS
YEAR TWO SEMESTER TWO EXAMINATIONS

FOR THE DIPLOMA
(INFORMATION TECHNOLOGY)

COURSE CODE   :   DIT 079
COURSE TITLE   :   DIGITAL ELECTRONICS

DATE: 01/09/2022   TIME: 9.00 A.M.-10.00 A.M.

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTIONS ONE AND ANY OTHER TWO.

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 two 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]**

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

f. 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

Product Of Sums with respect to digital electronics [2 marks]

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

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

e. Outline two different techniques used for simplifying boolean equations

[2 marks]