



*(Knowledge for Development)*

**KIBABII UNIVERSITY**  
**(KIBU)**

**UNIVERSITY EXAMINATIONS**  
**2020/2021 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: 06/10/2021**      **TIME: 9.00 A.M. – 11.00 A.M.**

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**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]