(Knowledge for Development)

KIBABII UNIVERSITY

(KIBU)

MAIN CAMPUS

UNIVERSITY EXAMINATIONS

END OF SEMESTER EXAMINATION

2021/2022 ACADEMIC YEAR

SECOND YEAR SECOND SEMESTER EXAMINATION

FOR THE DIPLOMA IN

(INFORMATION TECHNOLOGY)

COURSE CODE: DIT 079

COURSE TITLE: DIGITAL ELECTRONICS

DATE: 11/05/2022 TIME: 9.00 A.M. – 11.00 A.M.   2HRS

INSTRUCTIONS TO CANDIDATES:

ANSWER QUESTION ONE AND ANY OTHER TWO.

Paper Consists of 3 Printed Pages. Please Turn Over ➡

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QUESTION ONE [24 MARKS]

a. Name any four different types of number systems. [4 marks]

b. List the different basic logic gates [3 marks]

c. Outline the two different categories through which numerical values of quantities can be represented. [2 marks]

d. Define the term digital quantity hence state an example. [3 marks]

e. Determine the binary equivalent of $(17E.F6)_{16}$ [2 marks]

f. Contrast between 'Minterms' and 'Maxterms' [2 marks]

g. State the different categories of sequential logic circuits. [3 marks]

h. Utilizing boolean algebra, solve the following boolean expression [5 marks]

$$F = C (B + C) (A + B + C)$$

QUESTION TWO [18 MARKS]

a. Define the term universal logic gates [2 marks]

b. List two universal logic gates [2 marks]

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

d. Outline the two 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 [3 marks]

$$X = A (B + C)$$

QUESTION THREE [18 MARKS]

a. Define the term shift register. [2 marks]

b. Enumerate the basic types of registers [4 marks]

c. State any 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 basic 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]