



(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: 19/01/2022

TIME: 1.00 A.M. – 1.00 P.M.

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTIONS ONE AND ANY OTHER TWO.

QUESTION ONE (COMPULSARY) [24 MARKS]

- a. Define the term digital system hence give one example of such a system. [3 marks]
- b. What is a Logic gate? [2 marks]
- c. Draw a truth table and a logic diagram that implements the following function.
 $T(\bar{S}+P)$ [6 marks]
- d. Define a combination logic circuit by outlining its three major attributes. [3 marks]
- e. What is propagation delay? [2 marks]
- f. What is the binary equivalent of the decimal number 368 [3 marks]
- g. Prove that $ABC + ABC' + AB'C + A'BC = AB + AC + BC$ [5 marks]

QUESTION TWO [18 MARKS]

- a. Outline the boolean axioms of the NOT logic gate [2 marks]
- b. A computing system performs its calculations based on Boolean algebra. Explain step by step how the computer performs the calculation (45-20) [5 marks]
- c. Simplify $A + BC$ to its Standard Sum of products hence find its min-terms [5 marks]
- d. Minimize the logic function $F(A,B,C,D) = \sum m(1,3,4,5,6,7,9,12,13)$ using Karnaugh map method. [6 marks]

QUESTION THREE [18 MARKS]

- a. What is a sequential logic circuit? [2 marks]
- b. What is a flip flop? [2 marks]
- c. Define the term edge-triggering with respect to flip-flops. [2 marks]
- d. State the four kinds of flip flops [4 marks]
- e. Draw a JK flip flop and its characteristic table [4 marks]
- f. Outline any four applications of flip flops. [4 marks]

QUESTION FOUR [18 MARKS]

- a. Draw the symbol of an Exclusive-NOR gate and its truth table. [4 marks]
- b. Generate an AND function using a NAND gate topology. [3 marks]
- c. State and illustrate with the help of an example the three main ways of specifying the function of a combinational logic circuit. [6 marks]
- d. Explain the operation of a BCD to seven segment display hence illustrate its truth table. [5 marks]

QUESTION FIVE [18 MARKS]

- a. With the help of a diagram, explain how propagation delay is experienced in a ripple counter. [6 marks]
- b. Design a 3-bit binary up counter [12 marks]