

**W1-2-60-1-6**

## JOMO KENYATTA UNIVERSITY

**OF**

**AGRICULTURE AND TECHNOLOGY**

# University Examinations 2014/2015

**FIRST/SECOND YEAR SECOND/FIRST SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY**

**ICS 2205 : DIGITAL LOGIC**

**DATE: APRIL 2015 TIME: 2 HOURS**

**INSTRUCTIONS: ANSWER QUESTION ONE (COMPULSORY) AND**

**ANY OTHER TWO QUESTIONS.**

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**QUESTION ONE (30 MARKS)**

(a) Explain two categories of electronic circuits. [2 marks]

(b) Distinguish between binary number system and hexadecimal number system. [4 marks]

(c) Explain any three logic gates. [6 marks]

(d) Convert 126.75 to binary. [5 marks]

(e) Implement the logic expression A+AD+BC using logic gates.

[5 marks]

(f) Prove that A+A= A+B. [3 marks]

(g) Any Demorgan’s theorem on the expression ABC+DEF. [3 marks]

(h) Distinguish between a K-Map and a Multiplexer. [2 marks]

**QUESTION TWO (20 MARKS)**

(a) Simplify the expression AB+A(B+C)+b(B+C) using Boolean algebra rules and laws. [5 marks]

(b) Draw a truth table for a 3 input OR gate. [5 marks]

(c) Draw half adder logic circuit. [5 marks]

(d) Convert 100111011.011to hexadecimal. [5 marks]

**QUESTION THREE (20 MARKS)**

(a) Convert the Boolean expression A+B(CD+F) to standard sum of products. [5 marks]

(b) Perform the operation 26-20 using two’s compliment. [5 marks]

(c) Use a K-Map to simplify F(ABCD) = (1,3,4,5,6,7,9,12,13).

[10 marks]

**QUESTION FOUR (20 MARKS)**

(a) Explain the laws of Boolean algebra. [6 marks]

(b) Briefly explain combinational circuits. [4 marks]

(c) Develop a truth table for the expression +A+ABC.

[5 marks]

(d) Reduce the expression C+ + D using DeMorgan’s theorem and Boolean algebra and draw the logic diagram of the simplified expression. [5 marks]

**QUESTION FIVE (20 MARKS)**

(a) Draw the logic symbol of the NAND gate and explain its universality.

[5 marks]

(b) Convert 2EE to binary. [4 marks]

(c) Using logic gates to show that the association law of addition

A+(B+C) = (A+B) + C is true. [5 marks]

(d) Explain any three application areas of digital circuits. [6 marks]