KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2010/2011

INSTITUTE OF OPEN AND DISTANCE E-LEARNING

EXAMINATION FOR THE DEGREE OF BACHELOR OF INFORMATION TECHNOLOGY

SIT 112: INTRODUCTION TO DIGITAL ELECTRONICS

DATE: Tuesday 1st February, 2011 **TIME:** 2.00 p.m. – 4.00 p.m.

INSTRUCTIONS

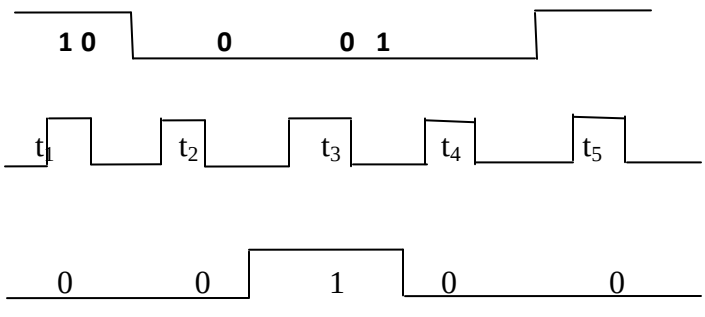
*Answer question **ONE** and any other **two.***

QUESTION ONE

1. What are the clues that an electronic product contains digital circuitry? (3 Marks)
2. With the help of a simple circuit, explain how a digital signal is generated. (3 Marks)
3. Convert the following numbers to their equivalent:
   a). 762_8 to decimal (2 Marks)
   b). 110111_2 to octal (2 Marks)
   c). $3E6_{16}$ to decimal (2 Marks)
4. Write a Boolean expression that describes a three-input XOR gate. (2 Marks)
5. Simplify the following Boolean expression using Karnaugh Maps:

   $\overline{A} \cdot B + \overline{A} \cdot B + A \cdot B = Y$ (4 Marks)

6. Draw the logic symbol for a clocked R-S flip-flop. List the mode of operation of the clocked R-S flip-flop for each input pulse shown in the figure below. Answer with the terms "set", "reset", " hold", and "prohibited":



(12 Marks)

QUESTION TWO

1. Construct a logic circuit using AND, OR, and NOT gates from the following Boolean expressions:

   a). $(A + B) . (\overline{A} + \overline{B}) = Y$

   b). $(\overline{A} + B) . \overline{C} = Y$

   c). $(A + B) . (\overline{C} + \overline{D}) . (\overline{A} + C) = Y$ (10 Marks)

2. In what modes do counters operate from? A technician's knowledge of the circuit and powers of observation are the most important tools in troubleshooting. What are the physical tools that aid the technician in troubleshooting sequential logic circuits? (10 Marks)

QUESTION THREE

1. Describe the term register and explain its relation to the flip-flop. (4 marks)
2. Simplify the Boolean expression $A . B . C + A . B . C + A. B. C + A . B . C = Y$ by
   a. plotting 1s on a three-variable Karnaugh map
   b. looping groups of two or four 1s
   c. eliminating variables whose complement appears within the loop(s)
   d. writing the simplified minterm Boolean expression. (16 Marks)

QUESTION FOUR

1. Draw logic circuit for the following Boolean expression $(A + B + C) . (A+ B) = Y$. (6 Marks)
2. Draw the logic circuit, logic symbol and truth table for a J-K flipflop and a clocked R-S flipflop. (14 Marks)

QUESTION FIVE

1. With the aid of a diagram show the flow of program instructions and data in a computer system. (10 Marks)
2. List the five modes of operation for the 74194 universal shift register IC. (10 Marks)

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