KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2016/2017 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

Date: 10th August, 2016.
Time: 11.00am –1.00pm

KCS 206 - DIGITAL LOGIC AND DESIGN

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a)   Perform the Boolean algebra simplification. $\overline{A}BC + A\overline{B}C + AB\overline{C} + ABC$

(7 Marks)

b)   Why do you need to know about Karnaugh maps?

(2 Marks)

c)   What is the basic difference between Latches and Flip flops?

(2 Marks)

d)   With help of diagrams use NOR gate to make NOT, AND, NAND and OR gates.

(8 Marks)

e)   With the help of a diagram explain edge triggered Flip-Flop.

(6 Marks)

f)   Convert the following;

   i) $(247.6815)_{10} = ()_8$

   ii) $(175.3942)_{10} = ()_{16}$

(5 Marks)

QUESTION TWO (20 MARKS)

a)   Simplify each Boolean expression to one of the following ten expressions;

   i) $A(A+\overline{A})+B = AA+A\overline{A}+B$

(2 Marks)

   ii) $(A+B)(\overline{A}+B)\overline{B} = (A+B)(\overline{A}\ \overline{B}+B\overline{B})$

(3 Marks)

   iii) $\left(\overline{\overline{A}B+\overline{B}}\right)0\left(\overline{B+\overline{A}B}\right)= 0$

(2 Marks)

   iv) $\overline{\overline{A}+\overline{B}} =$

(3 Marks)

b)   With a neat diagram explains full subtractor with truth table?

(5 Marks)

c)   Illustrates the distributive law in terms of gate implementation.

(5 Marks)

QUESTION THREE (20 MARKS)

a)   With help of a diagram explain D-type positive-edge triggered flip-flop.

(6 Marks)

b)   With diagrams, truth table proof 10,11 and 12 Basic rules of Boolean algebra.

(14 Marks)

QUESTION FOUR (20 MARKS)

a)   State and explain both De-Morgans theorems

(6 Marks)

b)   Explain in details "Don't Care" Conditions in k-map

(6 Marks)

c)   Using Boolean algebra techniques, simplify this expression $AB + A(B + C) + B(B + C)$

(5 Marks)

d)   For the above question (c) simplifies using gates

(3 Marks)

QUESTION FIVE (20 MARKS)

a)   Discuss variable, complement, and literal terms as used in Boolean algebra.

(4Marks)

b)   Define the following terms;

(6 Marks)

  i)   Bit

  ii)   Byte

  iii) Nibble

  iv)   Word

c)   Simplify: $A(A + B) + (B + AA)(A + B)$

(4 Marks)

d)   What is a race around condition related to JK Flip Flop?

(6 Marks)