KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2020/2021 ACADEMIC YEAR
SECOND YEAR, SECOND SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(COMPUTER SCIENCE)

KCS 206 - DIGITAL LOGIC AND DESIGN

Date: 17th December, 2020
Time: 8.30am – 10.30am

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS__

QUESTION ONE (30 MARKS)

a)   Define the following terms
  i)   State the commutative property of Boolean algebra   (2 Marks)
  ii) State De Morgan's theorem.   (2 Marks)
  iii) State the distributive property of Boolean algebra   (2 Marks)

b)   Name and explain four Digital Hardware Systems   (8 Marks)

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

                                                                      (4 Marks)
d)   Why do you need to know about Karnaugh maps?

                                                                      (2 Marks)
e)   What is the basic difference between Latches and Flip flops?

                                                                      (2 Marks)
f)   With help of diagrams use NOR gate to make NOT, AND, NAND and OR gates.
                                                                      (8 Marks)

QUESTION TWO (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 THREE (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

(2 Marks)

QUESTION FOUR (20 MARKS)

a) Convert the following;

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

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

(5 Marks)

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

(6 Marks)

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

(2 Marks)

ii) illustrates the distributive law in terms of gate implementation.

(5 Marks)

QUESTION FIVE (20 MARKS)

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

(4 Marks)

b) Define the following terms;

i) Bit
ii) Byte
iii) Nibble
iv) Word

(6 Marks)

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)