MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A constituent college of Jomo Kenyatta university of agriculture and technology)

FACULTY OF ENGINEERING AND COMPUTING

DICT2K11M/DICT11M   END OF SEMESTER EXAMINATION

AMA 2110   COMPUTATIONAL MATHEMATICS

a) Define the term 'set'   [1mark]
b) Define a Venn diagram   [1mark]
c) Find the values of X and Y in the following linear system using Cramer's rule [2marks]

   5X-4Y=2

   6X-5Y=1

d) What is the complement a of a null set and state why   [2marks]
e) State the laws of Boolean algebra   [3marks]
f) Given A= {1,2,3,4}, B={3,4,5}and C={5,6,7} prove the distribution law

                                                              [3marks]
g) Given the logic circuit below, give its Boolean expression   [3marks]
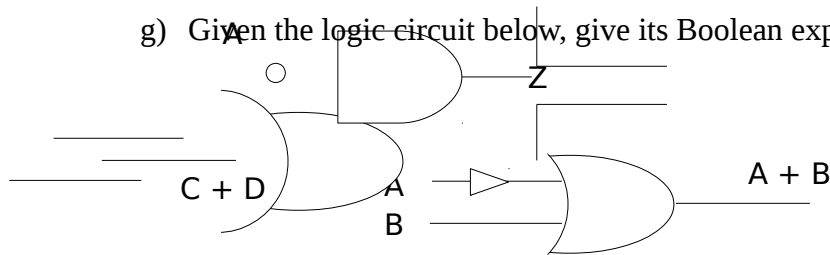
h) Draw the truth tables for AND, OR and NOT logical operations   [3marks]

i) Perform the following binary addition

1010 +0111   [2marks.]

Question 2

a) Define Boolean algebra

                                                                    [1mark]
b) Construct a truth table for the Boolean functions with three inputs XYZ and derive the

following functions: F=XYZ, F=XY+Z and F=X+YZ

                                                                    [9mrks]
c) Draw a simple analogy of the AND gate and construct its truth table   [6marks]

d) Express the decimal number 567:

    i   in binary   [1]

    ii   in octal   [1]

e) Draw the circuit symbols of NAND gate and NOR gate
        [2marks]

Question 3

Given the following Universal set U and its two subsets P and Q, where
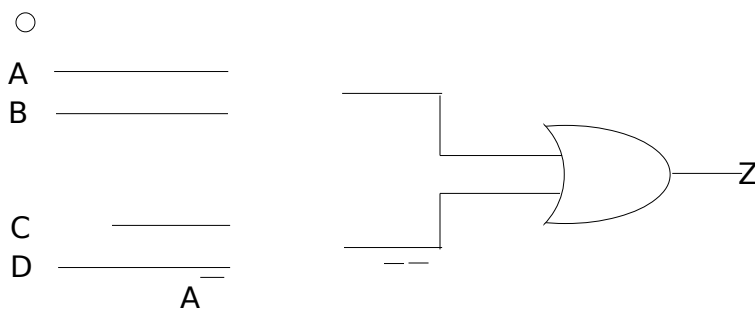
$$U = \{ x: x \text{ is an integer, } 0 <= x <= 10 \}$$

$$P = \{ x: x \text{ is prime number } \}$$

$$Q = \{ x: x^2 < 75 \}$$

    i)Draw a VENN diagram for the above   [8]

    iii   List the elements in P' ∩ Q   [3]

    iv

Convert 2AE hexadecimal to denary   [3]

Give the Boolean expression of the above logic circuits   [3marks]

Give the purpose of constructing truth tables   [1mark]

Give the number of all possible output combinations with two, three and four inputs respectively

[2marks]

Question 4

a) Differentiate between a set and a subset

[2mark]

b) Draw a logic circuit for the expression.
   $$\overline{AB}.C + A.\overline{B}.C + A.B.\overline{C}$$ [4marks]

c) Using cramer's rule, find the values of X, Y and Z   [6marks]

   2x –y +3z=-3

   -x -y +3z=-6

   X -2y-z =-2

d) Differentiate between odd parity bit and even parity bit   [4marks]

e) Differentiate between binary and decimal   [2marks]

f) State any four binary codes   [2marks]

Question 5

a) Define equivalent matrices   [1mark]

b) Compute the determinant of the following matrix   [3marks]

$$\begin{pmatrix} -5 & -1 & 1 \\ 10 & 2 & 3 \\ 1 & -2 & 6 \end{pmatrix}$$

567 octal to binary   [2]

        684 decimal to binary   [2]

Draw the circuit symbol for OR gate and construct its truth table with three inputs. [6marks]

Draw the logic circuit for the following expression   [3marks]

Z=A.B+C.D

Define a matrix   [1mark]

Express the number 747_8 in:
                i   Hexadecimal   [2]