THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY
DICT 2K 11M/DICT 11M

AMA 2110: COMPUTATIONAL MATHEMATICS

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER 2011

TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*

This paper consist of **FIVE** questions in **TWO** sections **A** & **B**
Answer question **ONE (COMPULSORY)** and any other **TWO** questions
Maximum marks for each part of a question are as shown
This paper consists of **FOUR** printed pages

SECTION A (COMPULSORY)

QUESTION ONE (20 MARKS)

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

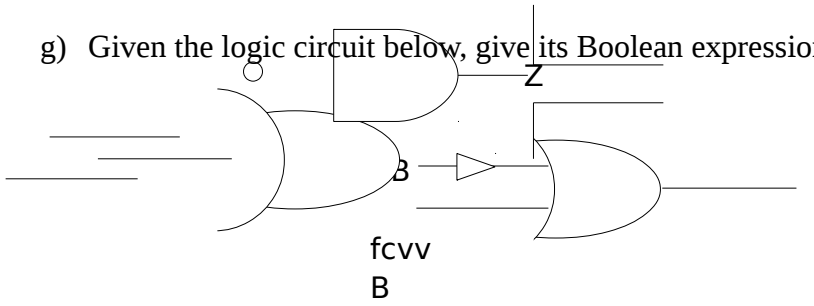
6X-5Y=1

d) What is the complement a of a null set and state why [2marks]

e) State the laws of Boolean algebra [3marks]

f) Given $\bar{A}$={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]

SECTION B (ANSWER ANY TWO QUESTIONS)

QUESTION 2 (20 MARKS)

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 [9marks]

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 marks]

ii in octal [1marks]

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

QUESTION THREE (20 MARKS)

a) Given the following Universal set U and its two subsets P and Q, where

U = { x: x is an integer, 0 <= x <= 10 }

P = { x: x is prime number }

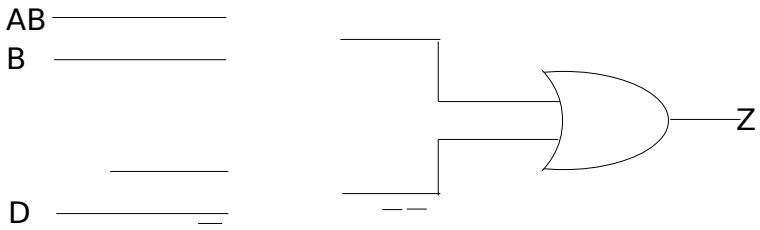
Q = { x: x^2 < 75 }

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

(ii) List the elements in P' ∩ Q [3marks]

(iii)

b) Convert 2AE hexadecimal to denary [3 marks]



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

d) Give the purpose of constructing truth tables [1mark]

e) Give the number of all possible output combinations with two, three and four inputs respectively [2marks]

QUESTION FOUR (20 MARKS)

a) Differentiate between a set and a subset [2mark]

b) Draw a logic circuit for the expression.

$\bar{A}B.C + A.\bar{B}.C + A.\bar{B}.C$ [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** types of binary codes [2marks]

QUESTION FIVE (20 MARKS)

a) Define equivalent matrices [1mark]

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

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

c) (i) 567 octal to binary [2 marks]

(ii) 684 decimal to binary [2marks]

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

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

Z=A.B+C.D

f) Define a matrix [1mark]

g) Express the number 747_8 in: Hexadecimal [2 marks]