THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY
DIT2K11M/DIT11M/DICT2K11M/DICT11M

AMA 2115/2110: MATHEMATICS FOR SCIENCE/COMPUTATIONAL MATHS

SPECIAL/SUPPLEMENTARY EXAMINATION

SERIES: FEBRUARY/MARCH 2012

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 **THREE** printed pages

SECTION A (COMPULSORY)

Question one

a) Draw a truth table for N·M· (P+N) **[4Marks]**

b) Form a system of NAND gates that can perform the operation of AND gate **[4Marks]**

c) Draw the logic circuit for the Boolean expression (A + C) · (AD + A· $\acute{D}$) + A·C + C and represent a simple circuit with equivalent output and provide it's truth table.
[12Marks]

SECTION B (ANSWER ANY TWO QUESTIONS)

Question 2

a) Outline the differences between ASCII and EBCDIC alphanumeric coding systems in use today. **[6Marks]**

b) Draw the symbol of a three input AND operator and list all the possible outputs. **[4Marks]**

c) Rewrite the signals provided below with both even and odd parity check.

i. 1011110 **[2Marks]**
ii. 1101001 **[2Marks]**

Code the decimal number equivalent to the 11000100_2 in:

i. Gray code **[2Marks]**
ii. 5211 Code **[4Marks]**

Question 3

a) Using the method of 4-bit two's complement evaluate the following

i. 5 – 14 **[3Marks]**
ii. 11 – 5 **[4Marks]**

b) Evaluate

i. $10110_2 \times 1110_2$ **[3Marks]**
ii. $1100110_2 \div 101_2$ (to 3d.p.) **[4Marks]**

c) Using 4-bit two's complement method solve

i. $0100_2 - 1101_2$ **[3Marks]**

ii. 5 – 3 **[4Marks]**

Question 4

a) Determine the inverse matrix of $\begin{pmatrix} -2 & 6 \\ 2 & -2 \end{pmatrix}$

[2Marks]

b) Kamau bought two t-shirts and three pairs of jeans and gave out £100 but he received a £36 as his change. Peter bought five t-shirts and two pairs of jeans at £61. Use matrices to calculate the cost of one shirt and a pair of jean **[4Marks]**

c) Use matrices to determine the solution set for the following system of equations.

4x -2y -3z = 8

5x +3y -4z = 4

6x -4y -5z = 12 **[14Marks]**

Question 5

a) Differentiate between weighted and Non-weighted codes **[4Marks]**

b) Represent the binary equivalent of decimal number 173 in Excess 3. **[3Marks]**

c) Solve 793 – 705 in BCD **[5Marks]**

d) Show that $\acute{A} + \acute{B} = A^{'} \cdot B$

[8Marks]