



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

*Faculty of Engineering & Technology*

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY (DIT 2K 11M/ DIT 11M)

**AMA 2115: MATHEMATICS FOR SCIENCE**

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 **THREE** printed pages

## SECTION A (COMPULSORY)

### Question one 20 marks

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]

## SECTION B (ANSWER ANY TWO QUESTIONS)

### Question two

- 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  $\bar{A} + \bar{B} = \overline{A \cdot B}$  [8Marks]

### Question 3

- a) Draw a truth table for  $N \cdot M \cdot (P + N)$  [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  $(A + C) \cdot (AD + A \cdot \bar{D}) + A \cdot C + C$  and represent a simple circuit with equivalent output and provide it's truth table. [12Marks]

### Question 4

- 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
- ii. 5211 Code

[2Marks]

[4Marks]

**Question 5**

- a) Determine the inverse matrix of  $\begin{pmatrix} -26 \\ 2-2 \end{pmatrix}$

[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]