THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

(A Centre of Excellence)

Faculty of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY
DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY
(DIT/J12 EV DICT/J12 EV)

AMA 2110: COMPUTATIONAL MATHEMATICS
AMA 2115: MATHEMATICS FOR SCIENCE

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2012
TIME: 2 HOURS

Instructions to Candidates:
You should have the following for this examination
- *Answer Booklet*

This paper consist of **FIVE** questions
Answer question **ONE** 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) Express the following signals with even and odd parity signal check.
   i) 10110111 **(2 marks)**
   ii) 11010000 **(2 marks)**

b) The signal 01101101 is transmitted with even parity. Determine if its error free signal, explain your answer. **(3 marks)**

c) State the **THREE** main differences between ASCII and EBCDIC. **(3 marks)**

d) What is the inverse matrix of $\begin{pmatrix} 3 & 4 \\ 1 & 2 \end{pmatrix}$ **(2 marks)**

e) Given $A = \begin{pmatrix} 2 & 7 \\ 1 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & 5 \\ 0 & 3 \end{pmatrix}$, what i:

   i) 2B – 3A **(3 marks)**

   ii) 2A + 3AB **(5 marks)**

SECTION B (Answer Any Two Questions)

Question Two (20 marks)

a) Convert the following as directed:
   i) $3B7_{16}$ to decimal **(2 marks)**
   ii) 247 to Binary **(3 marks)**
   iii) 4733 to Hexadecimal **(2 marks)**

b) Evaluate the following in 2's complement with 4 bits:
   i) $1011_2 - 1100_2$ **(2 marks)**
   ii) 11 – 14 **(3 marks)**

c) Using 8 bits, calculate the following:
   i) 87 – 93 in 1's complement **(3 marks)**
   ii) $1011101_2 \div 10101_2$ **(3 marks)**

d) Represent 59 in Excess 3 code **(3 marks)**

Question Three (20 marks)

a) A police man practiced shooting at the shooting range and used 100 rounds, if 61 of them hit the target, determine the probability that the officer will shoot at least 6 robbers using 8 rounds. **(5 marks)**

b) A glass jar contains 5 green, 6 red, 8 blue and 3 yellow marbles. Marbles are picked at random and without replacement at each selection.
   i) If 3 marbles are picked at random, what is the probability of choosing 2 red and a green marble? **(3 marks)**

ii) What is the probability of not selecting blue marble if 2 marbles are picked? **(3 marks)**

c) Usually DT-Dobie sales 2 cars per day. What is the probability a maximum of 3 cars will be sold tomorrow? **(4 marks)**

d) The following are continuous assessment marks for mathematics subject for eight students: 12, 18, 16, 21, 10, 13, 17 and 19.
   i) Determine the mean score **(2 marks)**
   ii) What is the variance of the student's score. **(3 marks)**

Question Four (20 marks)

a) Complete the table of binary coded decimals below.
b)

Decimal	**5211**	**Gray Code**	**Excess 3**
	1110110		
			10110101

(12 marks)

b) Evaluate the following 354-497 in BCD. **(4 marks)**

c) Represent the decimal number 713 in gray code. **(4 marks)**

Question Five (20 marks)

a) Draw the symbol of a 3 input NOR operator and determine its truth table. **(4 marks)**
b) Using NAND operator only develop a circuit to perform the function of a two input or operator. **(4 marks)**

$$A \bullet B \bullet C + A \bullet \overline{B} \bullet C + A \bullet B \bullet \overline{C} = Q$$

c) Given the Boolean expression
   i) Simplify the expression for Q. **(4 marks)**
   ii) Implement the simplified expression into a logic circuit **(4 marks)**
   iii) Determine the truth table for all possible values of input **(4 marks)**