THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

Faculty of Engineering and Technology

DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY

DIPLOMA IN INFORMATION TECHNOLOGY – DIT 2K 10J
(YR 2 SEM 2)

ECS 2215: COMPUTATIONAL MATHEMATICS

END OF SEMESTER EXAMINATIONS

SERIES: AUGUST/SEPTEMBER 2011

TIME: 2 HOURS

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

Answer question **ONE (COMPULSORY)** and any other **TWO** questions

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This paper consists of **THREE** printed pages
SECTION A (30 MARKS)

Question 1 (Compulsory)

a) Complete the table below

Decimal	Binary	Octal	Hexadecimal
297			
	1101001_2	151_8	
			$4f1_{16}$

(8 marks)

b) Using 4 bit representation, evaluate the following arithmetic's two's complement notation

    i) $14 - 8$ (3 marks)
    ii) $7 - 13$ (4 marks)

c) Draw the symbol of a three input NOR operator and list all the possible outputs

(3 marks)

d) Represent 13 as a BCD with the following methods Excess 3 and 2421   (4 marks)

e) Describe how Repetition Codes can be used as an error detection scheme   (3 marks)

f) Outline four sources of errors in a transmitted signal   (3 marks)

g) Name **TWO** alphanumeric coding systems in use today   (2 marks)

SECTION B (Answer any TWO questions (40 marks)

Question 2

a) Form a system of NAND gates that can perform the operation of NOR gate   (4marks)

b) Draw a truth table for P.T. (P+Z)   (4 marks)

c) Draw the logic circuit for the Boolean expression $(A+C)^{\cdot}$ $(AD + A.\overline{D})$ + A.C+C and represent a simple circuit with equivalent output   (12 marks)

Question 3

a) Represent the decimal number 237 in gray code   (4 marks)

b) Differentiate between weighted and non-weighted codes   (4 marks)

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

    (i) $7 - 13$ (3 marks)
    (ii) $11 - 5$ (3 marks)

d) Solve 713 – 975 in BCD (6 marks)

Question 4

a) Design a diode resistor assembly to depict the logic performed by an AND operator.

(7 marks)

b) Briefly describe how switches can be connected to perform the function of an OR operator

(6 marks)

c) Given $A^{\cdot}(B+C) + B^{\cdot}C = Q$ and that A = C 1, B = 0 determine the state of output signal Q.

(3 marks)

d) Determine all possible outputs of a three input Ex-OR operator (4 marks)

Question 5

a) Show that
$$\overline{A \cdot B} = \overline{A} + \overline{B}$$
(7 marks)

b) Evaluate

(i) $10110_2 \times 1110_2$ (3 marks)

(ii) $110110_2 \div 101_2$ (to 3 d.p.) (4 marks)

c) Using 4 – bit two's complement method solve
(i) 5 - 3 (4 marks)
(ii) $0110_2 - 1011_2$ (3 marks)