THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of JKUAT)

Faculty of Engineering & Technology

DEPARTMENT COMPUTER SCIENCE & INFORMATION TECHNOLOGY

CERTIFICATE IN INFORMATION TECHNOLOGY – CIT 2K 11S

AMA 1113: FUNDAMENTALS OF MATHEMATICS

END OF SEMESTER EXAMINATIONS

SERIES: DECEMBER 2011

TIME: 2 HOURS

SECTION A (COMPULSORY)

Question one 20 marks

a) Convert the following as directed:
    i.   297 to Base 16   **[3Marks]**
    ii. $9E7_{16}$ to Binary number   **[2Marks]**
    iii. 765_8 to Hex-decimal number   **[3Marks]**

b) Evaluate the following:

    i. $110110_2 \div 101_2$ **[3Marks]**
    ii. $11101_2 \times 1111_2$ **[3Marks]**
    iii. $111011_2 + 10110_2 + 11011_2$ **[2Marks]**

c) Represent the following numbers in there respective number systems:
    i. $A7E_{16}$ **[2Marks]**
    ii. 7457_8 **[2Marks]**

SECTION B (ANSWER ANY TWO QUESTIONS)

Question 2   20 marks

a) Rationalize and simplify the expressions

    i. $\dfrac{12}{3-\sqrt{5}}$ **[4Marks]**

    ii. $\dfrac{1-\sqrt{2}}{3+\sqrt{12}}$

              [3Marks]

b) Solve by a graphical method the system of equation provided; 2x + 3y = 5 and
      x – 3y = 7   **[7Marks]**

c) Rewrite the following in terms of x and y. Given x = log 2 and y = log 3

    (i)   Log 15   **[3Marks]**
    (ii)   Log 1.2   **[3Marks]**

Question 3 20 marks

a) Determine the exact value of:

    (i)   Tan 30°   **[3Marks]**
    (ii)   Cos 75°   **[4Marks]**

b) An angle of 0.7 radians at the centre of a circle subtends an arc of 17cm. Determine the radius of the circle.   **[4Marks]**

c) A triangle with sides a = 5; c = 8 and angle ACB = 59°. Determine:

    (i)   The length of line b   **[5Marks]**
    (ii)   The size of angle ACB   **[4Marks]**

Question 4   20 marks

a) The series 4, 16, 64, 256, ...

    i.   Determine the value of the 20th term   **[3Marks]**
    ii.   What is the sum of the second 5 terms   **[7Marks]**

b) An alarm beeps twice every second. If it is left to beep for 2 minutes and 13 second, how many beeps did it make?   **[4Marks]**

c) Using the binomial theorem, estimate the value of $(0.95)^5$ to 3dp   **[6Marks]**

Question 5 20 marks

a) A student at a certain college has 60% chance of passing an Examination at the first attempt. Each time a student fails and repeats the Examination; his chances of passing are increased by 15%. Calculate the probability that a student pass the Examination at the second or at the third attempt.   **[4Marks]**

b) Two balls are drawn successively without replacement from a box which contains 4 white balls and 3 red balls. Find the probability that:

    i)   Both balls are red.   **[3Marks]**
    ii)   The first ball drawn is white and the second is red   **[4Marks]**

c) $A = \begin{pmatrix} 24 \\ -13 \end{pmatrix}$ and $B = \begin{pmatrix} -23 \\ 40 \end{pmatrix}$. Determine the value of:

    i) $A + B$ **[3Marks]**
    ii) $A \times 3B$ **[6Marks]**