TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

CERTIFICATE IN INFORMATION TECHNOLOGY (CIT)

UKUNDA CAMPUS

AMA 1113: FUNDAMENTALS OF MATHS

END OF SEMESTER EXAMINATION
SERIES: AUGUST 2013
TIME: 2 HOURS

Instructions to Candidates:

You should have the following for this examination

- *Answer Booklet*
- *Mathematical Tables*
- *Scientific Calculator*

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) Solve the following equations:

(i) $4x^2 - 6x - 10 = 0$ **(4 marks)**

(ii)
$$8x + 15y = 150$$
$$12x - 6y = 160$$
(4 marks)

b) Calculate the value of $(1.002)^5$ correct to four places of decimal using the binomial theorem. **(7 marks)**

$$P = \begin{pmatrix} 3 & 4 \\ -4 & 3 \end{pmatrix} \qquad A = \begin{pmatrix} 2 & 0 \\ 0 & 1 \end{pmatrix}$$

c) Given that matrix P and matrix A
Find matrix m where $M = P^T \times AP$ **(7 marks)**

d) Evaluate the following:

(i) ${}^{10}C_4$ **(2 marks)**

(ii) ${}^{9}P_3$ **(2 marks)**

(iii) ${}^{7}C_3 \, x^6 P_2$ **(4 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

a) Express the following numbers to denary:

(i) 254.452_8 **(4 marks)**

(ii) 2163_8 **(3 marks)**

(iii) 1101.011_2 **(3 marks)**

b) Convert the following numbers into the indicated bases:

(i) $(110111)_2$ to decimal

(ii) $(2C)_{16}$ to octal

(iii) $(726)_{10}$ to octal **(10 marks)**

Question Three

$$\begin{pmatrix} 1 & 1 & 0 \\ 1 & 0 & -1 \\ 1 & 1 & 2 \end{pmatrix} \qquad \begin{pmatrix} 1 & -2 & -1 \\ -3 & 2 & 1 \\ 1 & 0 & -1 \end{pmatrix}$$

Given that A is the matrix and B is the matrix

a) Find the product AB **(4 marks)**

b) Evaluate the following with respect to matrix A

(i) Det A **(3 marks)**

(ii) Co-factor matrix C **(8 marks)**

(iii) The inverse of A i.e. A^{-1} **(5 marks)**

Question Four

The numbers of days the workers of a certain factory are absent in a year are as follows:

45	40	57	44	38	39	42	55	20	45
31	59	37	47	32	22	62	66	57	43
40	11	43	42	33	41	35	33	53	27
25	38	51	46	39	65	17	41	48	32
26	34	32	45	54	65	32	65	63	47

(i) Prepare a frequency distribution table for grouped data, use classes i.e. (10 – 19, 20 – 29 etc) **(8 marks)**

(ii) Calculate the mean **(5 marks)**

(iii) Calculate the standard deviation **(7 marks)**

Question Five

a) A shelf contains six white covered books and four black covered books. If two books are removed from the shelf. Find the probability that:

(i) Both are white **(3 marks)**

(ii) One is white and one is black **(4 marks)**

b) A research team has 8 programmers, 6 analyst and 4 operators. If **FOUR** member of the team are selected at random, calculate the probability that:

(i) At most one programmer is among the four **(5 marks)**

(ii) At least two operators are among the four **(5 marks)**

(iii) All the four are analysts **(3 marks)**