TECHNICAL UNIVERSITY OF MOMBASA

Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

PRE-CERTIFICATE IN INFORMATION TECHNOLOGY (PCIT)

AMA 1000: FUNDAMENTALS OF MATHEMATICS

SPECIAL/SUPPLEMENTARY EXAMINATION
SERIES: OCTOBER 2013
TIME: 2 HOURS

<u>**Instructions to Candidates:**</u>
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 quadratic equations:

(i)
$$2x^2 - 5x + 3 = 0$$
(3 marks)

(ii)
$$5x^2 + 3x - 7 = 0$$
(3 marks)

b) Solve the simultaneous equation:
$$7x + 2y = 11$$
$$4x + y = 7$$

(4 marks)

c) Write down the terms in each of the following Arithmetic Progression (AP)
   (i) $3 + 11 + \ldots$, 7th and 11th terms
   (ii) $7^{th} + 5\frac{1}{2} + \ldots$, 5th and 10th term **(4 marks)**

d) Using the concept of indices find the values of:

(i)
$$25^{\frac{1}{2}}$$

(ii)
$$27^{\frac{1}{3}}$$
(4 marks)

e) Using the concept of matrices, find:-
   (i) $A + B$

$$A = \begin{bmatrix} 3 & 5 & \frac{1}{2} \\ 4 & 4 & -1 \\ 2 & 0 & 1 \end{bmatrix} \qquad B = \begin{bmatrix} -1 & 4 & 0 \\ 3 & 0 & 2 \\ 1 & 5 & 6 \end{bmatrix}$$

   (ii) $A - B$ given   and **(6 marks)**

f) (i) Define the term probability **(2 marks)**

    (ii) Explain two methods of representing data in statistics **(4 marks)**

SECTION B (Answer any TWO questions from this section)

Question Two

The following times were taken by 150 trainees to learn how to operate a new machine:

Time in hours	10 – 19	20 – 29	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89
No. of Trainees	3	4	10	48	57	10	13	5

(i)   Draw a cumulative frequency curve to represent the above information and hence use the graph to estimate. **(10 marks)**

(ii)   Median **(3 marks)**

(iii)   Upper quartile **(3 marks)**

(iv)   Lower quartile **(3 marks)**

(v)   Inter quartile range **(1 mark)**

Question Three

$$A = \begin{pmatrix} 6 & 9 & 4 \\ -2 & 7 & 8 \\ 6 & -3 & 4 \end{pmatrix} \qquad B = \begin{pmatrix} 10 & 11 & 14 \\ -5 & -7 & 6 \\ 4 & 7 & 9 \end{pmatrix}$$

Given that matrix   and matrix

Find   (i) $A + B$ **(4marks)**

    (ii) $A - B$ **(4 marks)**

    (iii) $5B$ **(2 marks)**

    (iv) AB **(6 marks)**

Question Four

a) The table below shows the intelligent Quotients (IQS) of 100 pupils of a certain elementary school level.

1.Qs	Frequency
60 – 62	5
63 – 65	18
66 – 68	42
69 – 70	27
71 – 74	8

(i)   Draw a histogram to represent the data above. **(6 marks)**

(ii)   Use the histogram to estimate the mode of the data **(2 marks)**

(iii)   Calculate the mean of the distribution **(5 marks)**

b) Auma bought a 20 gigabytes (gB) hard disk on instability the software, the following information has gathered about the usage of the disk:

    Windows 2000 = 3 gB

    Microsoft of file = 5gB

    AutoCAD 2000 = 4gB

    Free space   = 8gB

Draw a pie chart to represent this information. **(7 marks)**

Question Five

a) In how many ways can a panel consisting of 8 people be selected if there are 14 capable candidates? **(4 marks)**

b) A project management team consists of three assessors, five co-coordinators and 6 project supervisors. A committee of 4 is to be selected. How many committees can be formed consisting of:
   (i)   Two assessor and two coordinators   **(3 marks)**
   (ii) All **FOUR** are project supervisors.   **(3 marks)**
   (iii) At least **TWO** coordinators are among the FOUR   **(4 marks)**

c) Given the formula:

$$V = \frac{\pi r^2 h^{\frac{1}{3}}}{L^3}$$

              make h the subject   **(3 marks)**

d) Solve for x without using tables: **(3 marks)**

$$3^{3x+1} = 9^{x+3}$$