# TECHNICAL UNIVERSITY OF MOMBASA

# Faculty of Applied & Health Sciences

DEPARTMENT OF MATHEMATICS & PHYSICS

**CERTIFICATE IN INFORMATION TECHNOLOGY (CIT)**

AMA 1113: FUNDAMENTALS OF MATHS

**SPECIAL/SUPPLEMENTARY EXAMINATION**
**SERIES:** OCTOBER 2014
**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)** Evaluate:-

    $9_{P_4}$

**(i)**                                                            **(4 marks)**

    $6_{c_2}$

**(ii)**

**(iii)**    In how many ways can a committee consisting of 10 people be selected if there are 15 capable candidates?     **(4 marks)**

**b)** The information concerning the enrolment of students in different courses at a college was gathered as shown below.

| COURSE | NUMBER OF STUDENTS |
|--------|--------------------|
| Management | 120 |
| Banking | 240 |
| Languages | 200 |
| Accountancy | 440 |

    Represent the information using a pie chart.     **(6 marks)**

**c)** Solve the following equations:-

    $2x^2 + 3x - 2 = 0$

**(i)**                                                           **(3 marks)**

**(ii)**    Solve for x in the equation below:     **(3 marks)**

    $x + y^2 = 5$

    $x + y = 3$

                                                      **(3 marks)**

**d)** The formula below is used in a certain field of technology:-

    $p = 1 + kt$

    **(i)**    Make k the subject of the formula

    **(ii)**   Find k when p = 100, t = 273     **(4 marks)**

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

**e)** Given that matrix                 and matrix

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

           (ii)  5 (A + B)                                        **(2 marks)**

**SECTION B (Answer any TWO questions from this section)**

**Question Two**

a) Certificate students taking a course in software development were asked to develop a program to do a certain task. The time taken (in minutes) to completely develop the program for fifty students was noted.

$$
\begin{array}{cccccccccc}
45 & 31 & 46 & 25 & 57 & 39 & 42 & 55 & 20 & 37 \\
40 & 59 & 1 & 38 & 34 & 22 & 62 & 33 & 48 & 43 \\
57 & 37 & 43 & 51 & 29 & 41 & 35 & 66 & 45 & 32 \\
44 & 47 & 42 & 46 & 54 & 65 & 17 & 35 & 53 & 27 \\
38 & 22 & 33 & 39 & 45 & 32 & 43 & 41 & 57 & 45
\end{array}
$$

   **(i)**     Using classes 10 – 19, 20 – 29, etc construct a frequency distribution table   **(8 marks)**
   **(ii)**    Use the frequency distribution to calculate the mean   **(4 marks)**
   **(iii)**   Calculate the variance.   **(6 marks)**
   **(iv)**   State the modal class and determine the upper class boundary   **(2 marks)**

**Question Three**

a) Use the binomial expansion to calculate the value of $(0.97)^{½}$   **(6 marks)**

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

c) If $(2x - y)^{15}$ is expanded in ascending powers of y. Find the coefficient of $x^4$   **(8 marks)**

**Question Four**

$$
A = \begin{bmatrix} 3 & -1 & 4 \\ 5 & 1 & -3 \\ 1 & -1 & 1 \end{bmatrix}
$$

a) Given that matrix   find the inverse of A i.e. $A^{-1}$   **(14 marks)**
b) Use the result in (i) above to determine the following operation $A. A^{-1}$   **(6 marks)**

**Question Five**

a) Write the decimal equivalent of the following numbers.
      $(7163.542)_8$

   **(i)**                      **(3 marks)**

$$(EF9.D06)_{16}$$

**(ii)** **(4 marks)**

$$(10001101.1101)_2$$

**(iii)** **(3 marks)**

**b)** Convert the following numbers to the indicated number bases.

$$(467.786)_{10}$$

**(i)** to octal **(3 marks)**

$$(1111001001\ 1)_2$$

**(ii)** to hexadecimal **(4 marks)**

$$(3616.76)_8$$

**(iii)** to binary **(3 marks)**