



**THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE**

***Faculty of Engineering & Technology***

**DEPARTMENT OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY**

**HIGHER DIPLOMA IN INFORMATION TECHNOLOGY**

**BRIDGING EXAMINATIONS**

**APRIL/MAY 2010 SERIES**

**MATHEMATICS**

**TIME: 2 HOURS**

**Instructions to Candidates**

- Answer **THREE** Questions only.
- Answer Question **ONE** and any other **TWO** Questions in Section B.
- Show all your working.
- Only Calculators are allowed.
- All mobile phones must be switched off.

**SECTION A : (COMPULSORY QUESTION 30 MARKS)**

**Question ONE**

(a). (i). Solve for x;

$$\log(x^2 - 1) + \frac{1}{\log_{(x+1)} 10} = \log_5 5 \quad \text{(4 Marks)}$$

(ii).  $2x^2 = 16^{x-2}$  (3 Marks)

(iii).  $\frac{2}{1+3x} - \frac{1}{2-x} = \frac{3}{7}$  (4 Marks)

(b). Simplify the following:

(i).  $\frac{\sin^2 \theta \sec \theta}{\cos \theta \cot a\theta}$  (3 Marks)

(ii).  $\frac{\tan^2 \theta \cot a\theta}{\sin \theta}$  (3 Marks)

(c). Find the exact value of the following, without using calculators.

(i).  $\tan 30^\circ$  (3 Marks)

(ii).  $\csc 15^\circ$  (4 Marks)

(d). Evaluate

(i).  ${}^8P_6 \times {}^5C_2$  (3 Marks)

(ii).  $\frac{10!}{6! 8! 3}$  (3 Marks)

**SECTION B : (ANSWER ANY TWO QUESTION EACH 20 MARKS)**

**Question TWO**

(a). Solve for x and Z using inverse method.

$$3x + 4y - 2z = 3$$

$$5x + 3y + 3z = 6$$

$$4x + 4z - 2z - 5y = 18$$

(12 Marks)

(b). Given  $A = \begin{pmatrix} 3 & 2 \\ 1 & 5 \end{pmatrix}$  and  $B = \begin{pmatrix} 2 & 1 \\ 1 & 3 \end{pmatrix}$

Find the value of:

(i).  $A^3 + 5B - A.B$

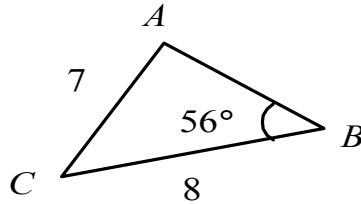
**(5 Marks)**

(ii). Show that  $AA^{-1} = A^{-1}A = I$

**(3 Marks)**

**Question THREE**

(a). Solve the triangle ABC given below.



**(6 Marks)**

(b). Show that  $a^2 = b^2 + c^2 - 2bc \cos A$

**(8 Marks)**

(c). Write  $\tan \theta$  in terms of  $\sin \theta$  and  $\cos \theta$ .

**(2 Marks)**

(d). Simplify the following expression.

$$\frac{\cos \theta \tan \theta}{\sin^2 \theta \sec \theta}$$

**(4 Marks)**

**Question FOUR**

(a). The department of Computer Science has 5 men and 4 women. A committee of 3 people is to be selected from among the members.

Required:

(i). The number of ways the committee can be formed.

**(4 Marks)**

(ii). The number of ways the committee can be formed if at least one member of the committee must be a woman.

**(8 Marks)**

(b). In how many ways can a bit string of length 10 be formed if the first 2 digits are ones and the last digit is zero.

**(4 Marks)**

(c). In how many different ways can the alphabets of the word MAMMAL be arranged if repetition is not allowed?

**(4 Marks)**

### **Question FIVE**

(a). Solve for x

(i).  $\log_x 9 + \frac{1}{\log_3 X^2} = 2.5$

**(5 Marks)**

(ii).  $\frac{2^x}{2} = 5^{x+1}$

**(3 Marks)**

(b). Express as an index to appropriate base.

(i).  $\log_2 7 + \frac{1}{\log_5 2} - 5$

**(5 Marks)**

(ii).  $\log_4 X + \log_4 Y - \log_4 XY = 5 \log_4 4$

**(2 Marks)**

(c). If  $X = \log_2 3$  and  $Y = \log_2 5$ . Express the following in terms of X and Y.

(i).  $\log_2 0.6$

**(2 Marks)**

(ii).  $\log_2 1.5(\log_2 1.8)$

**(3 Marks)**