

**KABARAK**



**UNIVERSITY**

**UNIVERSITY EXAMINATIONS**

**2009/2010 ACADEMIC YEAR**

**FOR THE CERTIFICATE OF PRE – UNIVERSITY MATHEMATICS**

**COURSE CODE: BMATH 002**

**COURSE TITLE: BASIC ALGEBRA**

**STREAM: BRIDGING**

**DAY: WEDNESDAY**

**TIME: 9.00 – 11.00 A.M.**

**DATE: 28/04/2010**

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**INSTRUCTIONS:**

Attempt question **ONE** and any other **TWO** questions.

**PLEASE TURN OVER**

**QUESTION ONE (30 MARKS)**

- (a) Given a quadratic equation  $ax^2 + bx + c = 0$ , by use of completing square method deduce the quadratic formula hence solve  $x^2 + 5x + 6 = 0$  (5 marks)
- (b) In how many ways can 7 people be sited at a round table. (3 marks)
- (c) Solve the following simultaneous equations by the matrix method;  
$$\begin{aligned}x - 2y &= 1 \\4y + 2x &= 10\end{aligned}$$
 (4 marks)
- (d) In a geometrical progression the sum of the second and third terms is 6 and sum of the third and fourth terms is  $-12$ . Find the first term and common ratio. (5 marks)
- (e) (i) In how many distinct ways can the letters of the word MISSISSIPPI be arrange? (2 marks)  
(ii) Evaluate;  $2^x + 2^{x+2} = 10$  (2 marks)
- (f) Use the Binomial theorem to find the approximate value of  $(0.98)^5$  (4 marks)
- (g) Calculate the sum of the series;  $1, -\frac{3}{2}, -4, -\dots - 49$  (5 marks)

**QUESTION TWO (20 MARKS)**

- (a) Solve the following equations
- (i)  $4^x - 2^{x+1} = 8$  (3 marks)
- (ii)  $27^{\left(\frac{3}{4}-x\right)} = 81^{\left(x-\frac{1}{4}\right)}$  (5 marks)
- (iii)  $\log(x + 3) + \log(x + 2) = \log 6$  (3 marks)
- (b) Solve the following equations
- (i)  $x^4 - 20x^2 + 64 = 0$  (3 marks)
- (ii)  $2x + \frac{1}{x} = 3$  (3 marks)
- (iii)  $4x^4 + 15x^2 = 4$  (3 marks)

**QUESTION THREE (20MARKS)**

- (a) Given that  $A = \begin{bmatrix} 1 & 3 \\ 2 & 6 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 1 \\ 2 & 2 \end{bmatrix}$   
Find  
(i)  $5A + 2B$  (2marks)  
(ii)  $A - 2B$  (2marks)  
(iii)  $A \times B$  (2marks)  
(iv)  $A^{-1}$  (3marks)
- (b) Given that  $P = \begin{bmatrix} 2 & 3 \\ -1 & 0 \end{bmatrix}$  and  $Q = \begin{bmatrix} 4 & 5 \\ 1 & -1 \end{bmatrix}$  Find  $S$  given  $PS = Q$ . (4marks)
- (c) The 3<sup>rd</sup>, 5<sup>th</sup> and 8<sup>th</sup> terms of an A.P are the consecutive terms of a G.P. Given that the first term of the A.P is 8 determine the common difference  $d$  and the common ratio  $r$ . (5marks)
- (d) How many distinct arrangements are there of the letters in the word RELATION (2 marks)

**QUESTION FOUR (20 MARKS)**

- (a) Derive the formula of A.P and hence find the sum of the following A.P  
 $x + 2x + \dots + nx$  up to 14 terms. (8 marks)
- (b) Derive the formula of the sum to infinity and hence find the sum of  $\{X_n\} = 0.45 \dots$  (7 marks)
- (c) A ball is dropped from a certain height and the first bounce takes  $\frac{2}{3}$  of the previous bounce. Find;  
(i) Total time for the first 4 bounces (2 marks)  
(ii) Total time until bouncing stops (3 marks)

**QUESTION FIVE (20 MARKS)**

- (a) (i) Find the value of  $x$  for which  $\begin{pmatrix} x & 2 \\ 5 & x - 3 \end{pmatrix}$  has no inverse. (3 marks)
- (ii) In how many ways can a committee of 4 be chosen from 5 boys and 4 girls if the committee must have at least one girl? (6 marks)

- (b) A group of students are on a tour. The total fare is Ksh. 120 and this is shared equally among the students. If two more students join the tour, each will pay shs. 2 less. Find the original number of students in the group. **(6 marks)**

(c) Given  $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$ ,  $B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$   $C = [2 \ 6]$

Find  $C(A^{-1} B)$  **(5 marks)**