



UNIVERSITY EXAMINATIONS

BRIDGING CERTIFICATE COURSE IN MATHEMATICS

COURSE CODE: BMATH 002

COURSE TITLE: BASIC ALGEBRA

STREAM: BRIDGING

DAY: WEDNESDAY

DATE: 26/08/2009

TIME: 9:00 – 11.00 A.M.

INSTRUCTIONS

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

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

- (a) Given a quadratic equation $x^2 + 5x + 6 = 0$, 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 6 people be seated at a round table. (3 marks)
- (c) Solve the following simultaneous equations by the matrix method;
$$\begin{matrix} -2 & = & 1 \\ 4 & + & 2 & = & 10 \end{matrix}$$
 (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 RELATION be arranged? (2 marks)
(ii) Evaluate; $2^x + 2^{x+2} = 10$ (2 marks)
- (f) Use the Binomial theorem to expand $(1 - 2)^n$ up to the term involving x^2 . (4 marks)
- (g) Calculate the sum of the series; $1 - \frac{1}{2} - \frac{1}{4} - \dots - \frac{1}{49}$ (5 marks)

QUESTION TWO (20 MARKS)

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

QUESTION THREE (20 MARKS)

- (a) Given that $A = \begin{pmatrix} 1 & 3 \\ 2 & 6 \end{pmatrix}$ and $B = \begin{pmatrix} 1 & 1 \\ 2 & 2 \end{pmatrix}$
Find
- (i) $A + B$ (2 marks)
- (ii) $A - 2B$ (2 marks)

(iii) $A \times B$ (2marks)

(iv) A^{-1} (3marks)

(b) Given that $\begin{pmatrix} 2 & 3 \\ -1 & 0 \end{pmatrix}$ and $\begin{pmatrix} 4 & 5 \\ 1 & -1 \end{pmatrix}$ Find given $\begin{pmatrix} \dots & \dots \\ \dots & \dots \end{pmatrix}$. (4marks)

(c) The 3rd, 5th and 8th 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 MISSISSIPPI (2 marks)

QUESTION FOUR (20 MARKS)

(a) Derive the formula of A.P and hence find the sum of the following A.P
 $1 + 2 + 3 + \dots + 14$ up to 14 terms. (8 marks)

(b) Derive the formula of the sum to infinity and hence find the sum of $\{ \dots \} = 0.7 \dots \dots$ (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 $\begin{pmatrix} 5 & -3 \\ x & 2 \end{pmatrix}$ 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 $\begin{pmatrix} 1 & 2 \\ -3 & 0 \end{pmatrix}$, $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$ = $\begin{pmatrix} 2 & 6 \end{pmatrix}$

Find C() (5 marks)