KABARAK UNIVERSITY

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE – UNIVERSITY

MATHEMATICS

COURSE CODE: PMATH 011

COURSE TITLE: BASIC ALGEBRA

STREAM: SEMESTER ONE

DAY: WEDNESDAY

TIME: 9.00 – 11.00 A.M.

DATE: 24/03/2010

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 sitted at a round table.

(3marks)

(c) Solve the following simultaneous equations by the matrix method;

$$x - 2y = 1$$
$$4y + 2x = 10$$

(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; $1, -\frac{3}{2}, -4, - \cdots - 49$ **(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 × 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 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 RELATION (**2 marks**)

QUESTION FOUR (20 MARKS)

(a) Derive the formula of A.P and hence find the sum of the following A.P

$x + 2x + \ - - - - - - + nx$ 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 ... .

(**7 marks**)

(c) A ball is dropped from a certain height and the first bounce takes $^2/_3$ 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 (2O 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 choosen 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 $A = \begin{bmatrix} 1 & 2 \\ -3 & 0 \end{bmatrix}$, $B = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ $C = [2 \quad 6]$

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