

KABARAK



UNIVERSITY

**EXAMINATIONS**

**2008/2009 ACADEMIC YEAR**

**BRIDGING CERTIFICATE COURSE IN MATHEMATICS**

**COURSE CODE: BMATH 002**

**COURSE TITLE: BASIC ALGEBRA**

**STREAM: BRIDGING**

**DAY: WEDNESDAY**

**TIME: 2.00 – 4.00 P.M.**

**DATE: 29/04/2009**

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**INSTRUCTIONS:**

- Answer Q1 and Q2 and Any other TWO Questions

**PLEASE TURN OVER**

**QUESTION 1. (20 marks)**

(a) Use the properties of exponential to simplify the following expressions

(i)  $\left[ (2x^2)^2 (4x^{-6}) (x^n)^0 \right]^{\frac{1}{2}}$

(ii)  $\frac{4^6}{4^2} \times 4^{-3}$

(iii)  $(2^2 \cdot 4^0)^3$

(iv)  $\left[ (x^2 y^{-3})^0 (xy^3) \right]^{-2}$

(v)  $\left( \frac{6^4}{4^3} x \frac{4^6}{6^{-3}} \right)^3$

(b) Solve for x in the following expressions;

i.  $4^{2x-6} = 1$

ii.  $\frac{3^{x+1}}{3^{2x-1}} = 3^{-4}$

iii.  $3^{x+1} = 81$

(c) Given  $\log 5 = 0.6990$  and  $\log 6 = 0.7782$ . Evaluate the following logarithms in base 10;

i)  $\log 30$       ii)  $\log 36$       iii)  $\log \sqrt{5}$       iv)  $\log 1.2$       v)  $\log_6 5$

ii. Using the basic properties of logarithms, solve the following equation for x

i.  $\log_3 x + \log_3 (1+x) = 2$

ii.  $\log_4 x - \log_4 (x-1) = 1$

(d) Evaluate the following expressions ;

i.  $\ln e^{-4}$

ii.  $\log_2 64$

iii.  $\frac{\log_4 64 + \log_4 16}{\log_4 256}$

**QUESTION 2. (20 marks)**

(a) solve for x in the following equations;

(i)  $\frac{x}{3} - \frac{3x}{2} = 2$

(ii)  $\sqrt{\left(\frac{1}{2x+1}\right)} = -2$

(iii)  $3x^2 - 9x - 30 = 0$

(iv)  $x^2 = 11x$

(v)  $\frac{3}{x-2} = \frac{2}{2x+4}$

(b) i) How many distinguishable permutations can be formed using the letters in the word MATHEMATICS ?

ii) evaluate;  $\frac{(n+1)!}{(n)!}$

iii) find the equation of a line that is parallel to the line described by the equation,  $y = 3x - 1$  and passes through the point (4,-2).

**QUESTION 3. (15 marks)**

(a) The sum of three consecutive even numbers is 30. Find the numbers.

(b) Three students are planning to rent a house and share the rent equally. If by adding another student each one could be saving Ksh 120 each month, what is the total rent of this house

(c) Solve for x in the following absolute/inequality functions;

i)  $|3x + 5| = 10$                       ii)  $2 - 3x < 11$

ii)  $|3 + 2x| = |5x - 3|$

**QUESTION 4. (15 marks)**

(a) Perform the indicated operations if possible.

$$\text{i. } \begin{bmatrix} -1 & 4 \\ 2 & -6 \end{bmatrix} - \begin{bmatrix} 1 & -2 \\ 0 & 5 \end{bmatrix} \quad \text{ii. } \begin{bmatrix} 4 & -1 & 0 \\ 2 & 1 & 3 \\ 1 & 0 & 4 \end{bmatrix} + \begin{bmatrix} -2 & 1 & 3 \\ 5 & 6 & -8 \\ 3 & 0 & 7 \end{bmatrix}$$

$$\text{iii. } \begin{bmatrix} -1 & 4 \\ 2 & -6 \end{bmatrix} \times \begin{bmatrix} 1 & -2 \\ 0 & 5 \end{bmatrix} \quad \text{iv. } \begin{bmatrix} -3 & 5 \\ 2 & 0 \\ 1 & 4 \end{bmatrix} \times \begin{bmatrix} -2 & 1 & 3 \\ 5 & 6 & -8 \end{bmatrix}$$

(b) Find the determinants of the following matrices if they exist;

$$\text{i. } \begin{bmatrix} 5 & 4 \\ -3 & 2 \end{bmatrix} \quad \text{ii. } \begin{bmatrix} -3 & 2 & 1 \\ 3 & -1 & 2 \\ 4 & 0 & 5 \end{bmatrix}$$

(a) find the inverse of the following matrices if they exist;

$$\text{i. } \begin{bmatrix} 2 & -1 \\ 0 & 4 \end{bmatrix} \quad \text{ii. } \begin{bmatrix} -4 & 2 & -2 \\ 1 & 0 & 6 \end{bmatrix} \quad \text{iii. } \begin{bmatrix} \sin x & \cos x \\ -\cos x & \sin x \end{bmatrix}$$

**QUESTION 5. (15 marks)**

(a) Using the matrix method, solve the following system of linear equations;

$$\begin{aligned} 2x - 3y &= -10 \\ 3x + 2y &= 11 \end{aligned}$$

(b) Using the determinant method, find the following:

- i. The equation of a line that passes thro' the points ; (-1,3) and (3,6).
- ii. Area of a triangle whose vertices have the following co-ordinates (1,0) (5,0) and (5,3).
- iii. Check whether these points are collinear; (0,2), (3,4) and (6,1).

(c)  $A = \begin{bmatrix} x & 4 \\ 3 & 2 \end{bmatrix}$  If A is a singular matrix, find the possible value(s) of x