KABARAK   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

2009/2010 ACADEMIC YEAR

FOR THE CERTIFICATE OF PRE- UNIVERSITYMATHEMATICS

COURSE CODE: **PMATH 011**

COURSE TITLE: **BASIC ALGEBRA**

STREAM: **SEMESTER ONE**

DAY: **THURSDAY**

TIME: **9.00 – 11.00 A.M.**

DATE: **03/12/2009**

INSTRUCTIONS:

1. **Answer Question ONE and ANY TWO Questions**

2. **Show your working clearly and neatly**

PLEASE TURN OVER

QUESTION ONE (30 MARKS)

1. Solve for the equation $4x^2-8x+13=0$ using the completing the squares method　　　(3 marks)

2. Given $\mathbf{A} = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$, $\mathbf{B} = \begin{bmatrix} 1 & 0 \\ 4 & 1 \end{bmatrix}$

   Find:
   a) $\mathbf{AB}$
   b) $\mathbf{A + B}$
   C) $\mathbf{A^{-1}}$　　　　　　　　　　　　　　　　　　　　　(6 marks)

3. Expand $(p+3)^5$　　　　　　　　　　　　　　　　　(2 marks)
4. In January 1980 a man's salary was K£2520 p.a, if his annual increment is K£108. Find his salary in January 1986.　　　　　　　　　　　(4 marks)

5. The sum of three terms of a G.P is 26.If the common ratio is 3. Find the sum of the first 6 terms.
　　　　　　　　　　　　　　　　　　　　　　　(3 marks)

6. Solve for x in the following:-

   a) $4^{2x}.4^6 =1$

   b) $4^{4x} \div 2^{2X} = 2^4$

   c) $3^{2x} = \dfrac{1}{3^{4-X}}$

   d) $\dfrac{1}{64} = \dfrac{1}{36^x}$　　　　　　　　　　　　　(4 marks)

7. Without using tables find the value of
   (i) $\text{Log}_2 64 - \text{Log}_2 16$　　　　　　　　　　(2 marks)

   (ii) $\dfrac{\text{Log } 18 - \text{Log } 6}{\text{Log } 6 - \text{Log } 2}$　　　　　　　　　　(3 marks)

8. Solve the following inequality and express the solution set.
   $$\frac{2x+3}{4} + 6 \geq 2 + \frac{4x}{3}$$
　　　　　　　　　　　　　　　　　　　　　　　(3 marks)

QUESTION TWO (20 MARKS)

a. A club has 9 members. In how many ways can a president, a vice-president and secretary be chosen   from the members in this club   (3 mark)

b. Expand $(2x + 3y)^5$ (3 marks)

c. Solve the following quadratic equations
    (i) $6x^2+5x-6=0$ (2 marks)
    (ii) $\dfrac{1}{X+1} + \dfrac{3}{x-1} = 2$ (2 marks)

d. In the arithmetic series $1+4+7+10+\ldots\ldots\ldots\ldots$ find the sum of the first fifty terms   (2 marks)

e. Find the sum of the first 10 terms of $8+24+72+\ldots\ldots\ldots\ldots$.   (2 marks)

f. .Given that $\text{Log }_{10}5 = 0.6990$ & $\text{Log}_{10}6 = 0.7782$. find the following logarithms
    (i) $\text{Log }_{10} 30$
    (ii) $\text{Log }_{10}6 \div \text{Log}_{10}5$
    (iii) $\text{Log }_{10}5^{\frac{1}{2}}$ (6 marks)

QUESTION THREE (20 MARKS)

a. Use the binomial expansion to evaluate $(1.01)^5$ to 4 s.f.   (2 marks)

b. Use matrix method to solve the following simultaneous equation

$$x - 2y = 4$$
$$2x + y = 3$$ (3 marks)

c. Given that $(mx+7)^2 = nx^2 + 14mx +p$. Where m, n and p are integers, find their values. (4 marks)

d. Simplify the following giving your answers as indices
    (i) $a^{1/3} \cdot a^{7/3}$
    (ii) $(2a^3b^4)^{3/4}$ (2 marks)

e) Find inverse of the following matrices

(i) $\begin{pmatrix} 1 & 3 \\ -2 & 1 \end{pmatrix}$ (1 mark)   (ii) $\begin{pmatrix} x & x/2 \\ y/2 & y \end{pmatrix}$ (2 marks)

f) Rewrite the following expressions as a single logarithm.

(i) $2 \log_b x + \frac{1}{2}\log_b x + 4$ (2 marks)

(ii) $4\log_b(x+2) - 3\log_b(x-5)$ (2 marks)

g) Find the range of x if $-4 \leq 2x-2 \leq 8$ (2 marks)

QUESTION FOUR (20 MARKS)

a. Define a Quadratic equation (1 mark)

b. Find the numbers of different ways of placing 15 balls in a row given that 4 are red, 3 are yellow, 6 are black and 2 are blue (3 marks)

c. How many arrangements can be made of the letters in the word **BWBWBWBWR** (2 marks)

d. Find the inverse of the matrix A= $\begin{pmatrix} 5 & 2 \\ 4 & 3 \end{pmatrix}$ Hence or otherwise solve the simultaneous equation

$$5x + 2y = 8$$
$$4x + 3y = 5$$ (3marks)

e. The 2nd term of an AP is 15 and the 5th term is 21. Find the common difference and the 1st term. (4 marks)

f. Find the quadratic equation whose roots are 3, -2. Answer the question in the form $ax^2 + bx + c = 0$ where a, b and c are intergers. (3 marks)

g) Use binomial expansion to write the 5th and 12th terms of the following expression $(x+2)^{18}$ (4 marks)