CHUKA   **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN ANIMAL HEALTH AND PRODUCTION

MATH 00100/00121: INTRODUCTORY MATHEMATICS

STREAMS: CERT. ANHE   **TIME: 2 HOURS**

DAY/DATE: TUESDAY 05/12/2017   **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS: Answer question ONE and any other TWO questions

QUESTION ONE (30 MARKS)

(a)   Explain the following properties of real numbers.   [3 marks]

    (i)   Commutative property

    (ii)   Associate property

    (iii)   Additive identity property

(b)   Differentiate between natural numbers and integers.   [2 marks]

(c)   Given two points A (6, 4) and B (2, 3), find the equation of the line passing through the two points.   [3 marks]

(d)   Solve the equation below using factorization method $3x^2 = 2x + 8$ [3 marks]

(e)   Find the equation of the line passing through points (4, 6) and is parallel to the line whose equation is $y = \frac{2}{3}x + 5$ [4 marks]

(f)   Solve the system of equations below by substitution method   [4 marks]

$$x - y = 2$$

$$2x + y = 10$$

(g)   Determine the values of a, b, c and d so that the following equation becomes valid.

[4 marks]

$$\begin{bmatrix} a & b - 2d \\ -3 & 2b \\ a + c & 7 \end{bmatrix} = \begin{bmatrix} 5 & 1 \\ -3 & 6 \\ 4 & 7 \end{bmatrix}$$

(h)   Given function $g(x) = -x^2 + 4x + 1$, find;   [2 marks]

(i) $g(2)$

(ii) $g(t)$

(i)   Determine whether each algebraic expression is a polynomial.   [2 marks]

(i) $3x + 2^{-1}$

(ii) $\frac{1}{x} + \frac{1}{x^2}$

(j)   How many terms are there in the arithmetic sequence 4, 15, 26, …2853?   [3 marks]

QUESTION TWO (20 MARKS)

(a)   Use factor theory to determine if $x - 3$ is a factor of $2x^4 - 11x^3 + 15x^2 + 4x - 12$ and
        confirm using synthetic division.   [6 marks]

(b)   Solve the simultaneous equations below by matrix method   [5 marks]

$x + 2y = 4$

$3x - 5y = -1$

(c)   Find the sides indicted by letters p and q in the diagram below.   [5 marks]

(d)   Solve the equation $2\sin^2 x = \sin x$ for the values of $x, 0 \leq x \leq 360°$ [4 marks]

QUESTION THREE (20 MARKS)

(a)   If $f(x) = \begin{cases} x + 3 & ; x \leq 2 \\ 5 & ; 2 < x < 6 \\ x^2 + 1 & ; x \geq 6 \end{cases}$ [3 marks]

Find $f(x)$ at   (i) $f(1)$

(ii) $f(10)$

(iii) $f(5)$

(b)   Given $f(x) = 2x + 1$ and $g(x) = 4x$. Find   [6 marks]

   (i) $fog(x)$

   (ii) $gof(x)$

(c)   Solve the following systems of equation by elimination method.   [4 marks]

   $2x + y = 4$

   $x - y = -1$

(d)   Find the eighth term and the sum of AP 2, 6, 10, 14……….   [3 marks]

(e)   Find the values of K so that the sequence K-3, 2k-6, 3k-9 forms a G.P   [4 marks]

QUESTION FOUR (20 MARKS)

(a)   State the degree of each polynomial and the coefficient of x^2

   (i) $\frac{x^2}{3} - 5x^3 + 7$

   (ii) $x^{28} - x^2$

   (iii)   10

(b)   Find the inverse of the matrix $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ [4 marks]

(c)   Use quadratic formular to solve the equation $x^2 + 2x - 8 = 0$ [3 marks]

(d)   In the world dominoes tournament, 78, 125 players are placed in groups of 5 players per table. One game is played by these 5 players, and the winner at each table advances to the next round, and so on until the final game of 5 players. How many rounds would the ultimate winner have played. (Including the final round)?   [4 marks]

(e)   Find the equation of the line passing through points (2, 5) and is perpendicular to the line$-6x - 9y = 4$.   [3 marks]