CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF DIPLOMA IN TOURISM AND HOTEL MANAGEMENT AND DIPLOMA IN ANIMAL HEALTH

MATH 0121: INTRODUCTORY MATHEMATICS

STREAMS: **TIME: 2 HOURS**

DAY/DATE: TUESDAY 11/12/2018   **11.30 A.M. – 1.30 P.M.**

INSTRUCTIONS:
* **Answer question ONE and any other TWO**

QUESTION ONE

(a)   Use the commutative properties to rewrite each of the following expressions

   (i) $2+(-10)$
   (ii) $(x+2)-3$ (2 marks)

(b)   A car wash has two machines. The old machine washes one car in 0.1 hour, while the new machine washes one car in 0.08 hour. If both machines are operating, at what rate are the cars being washed?   (2 marks)

(c)   Simplify $\dfrac{6-9i}{-4+7i}$ (3 marks)

(d)   The first term of a sequence is 5. Each term is twice the term before. Write down the first eight terms of the sequence.   (3 marks)

(e)   Write down the series $\Sigma_{i-1}^{8}2^{i}$ in full and evaluate it.   (4 marks)

(f)   In how many ways can the letters of the word PERMUTATION be arranged in order for the vowels to come together?   (4 marks)

(g)   Classify each of the following numbers

      (i)   0.1825252525

      (ii)   0. $\dot{1}6$

      (iii)   1.47123482   (3 marks)

(h)   Define a function $f(x)$ by

$$f(x)=\begin{cases} 3x+6 & if\ x\leq 2 \\ x^2-1 & if\ 2<x\leq 5 \\ 10 & if\ x>5 \end{cases}$$

    Evaluate   (i) $2f(1)$

                 (ii) $f(11)$

                 (iii) $f(-2)$ (4 marks)

(g)   Given the function $f(x)=x^2-x-2$, find $f(x+h)$ (5 marks)

QUESTION TWO

(a)   Find the sum of the positive integers from 1 to 100 inclusive.   (4 marks)

(b)   Use the Pascal's triangle to write out the expansion of $¿-3x-4y¿^6$ (5 marks)

(c)   Solve for n in $nc_2 =28$ (5 marks)

(d)   Using examples justify the following statements

      (i)   All natural numbers are integers but all integers are not natural numbers.

      (ii)   An integer is a rational number   (6 marks)

QUESTION THREE

(a)   An AP has third term 3 and fifth term 9. Find the first term and common difference.
                                                           (5 marks)
(b)   Find the quotient and the remainder when x^5+1 is divided by $x-1$ (5 marks)

(c)   Given $f(x)=3x-1$

$h(x)=2x+2$

Show that in general $foh(x) \neq hof(x)$ (5 marks)

(d)   Given $\delta_1=2+3i$

$\delta_2=-4+6i$

Evaluate   (i) $\delta_2 \delta_1$ (2 marks)

(ii) $\dfrac{\delta_1}{\delta_2}$ (2 marks)

(iii) $\delta_1|\delta_1|$ (1 mark)

QUESTION FOUR

(a)   Prove analytically that $A \cup (B \cap C)=(A \cup B) \cap (A \cup C)$ (5 marks)

(b)   Solve the trigonometric equation $2 \tan^2 \theta = \tan \theta + 1$ (5 marks)

(c)   Consider the right-angled below

From the triangle, show that $1+\tan^2 \theta = \sec^2 \theta$ (5 marks)

(d)   Given $f(x)=x^2+1$

$g(x)=x-1$

Evaluate   (i) $fog(1)$ (2 marks)

      (ii) $g\,of(2)$ (2 marks)

      (iii) $f\,of(x)$ (1 mark)

QUESTION FIVE

(a)   Construct a truth table to verify if the statements $(P \lor Q)$ AND $P \land Q$ are equivalent.   (5 marks)

(b)   Consider the diagrammatic representation of the number system below.

      Identify the set of numbers represented by

      (i) x -

      (ii) y -

      (iii) a -

      (iv) b -

      (v) c -

      (vi) d -   (6 marks)

(c)   A committee of five men and four women is to be chosen from eight men and 6 women. In how many ways can this be done?   (4 marks)

(d)   The second terms of a cap is 2 and the fourth term is 18. Find the possible values of the common ratio and the corresponding first terms.   (5 marks)