CHUKA  **UNIVERSITY**

UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF CERTIFICATE IN

MATH 00101: FOUNDATION MATHEMATICS

STREAMS: CERT **TIME: 2 HOURS**

DAY/DATE: FRIDAY 14/12/2018 **2.30 PM – 4.30 PM**

INSTRUCTIONS:

Answer Question One and any other Two

QUESTION ONE

(a) Simplify

(i) $\frac{x^2 y^2}{x^4 y}$ [2 marks]

(ii) $\frac{15x^6}{3x^4 5x^2}$ [2 marks]

(b) Evaluate

(i) $\log_4 2$ without use of a calculator [2 marks]

(ii) $\log_3\left(\frac{1}{27}\right)$ [3 marks]

(c) Write out the following series in full and evaluate it

$$\sum_{i=-2}^{4} i^2$$

(d) Find the sum of the first 10 terms of a GP with first term 3 and common ratio 2. [3 marks]

(e) Let $f(x)=x^2+1$

$g(x)=3x+5$

Find:

(i) $(f+g)(1)$ [2 marks]

(ii) $(f-g)(-3)$ [3 marks]

(f) Simplify $\frac{\cos^2\theta}{1+sin\theta}+\frac{\cos^2\theta}{1-sin\theta}$ [4 marks]

(g) Define the following terms as used in statistics

(i) Population
(ii) Sample
(iii) Census
(iv) Survey
(v) Variable [5 marks]

QUESTION TWO

(a) Solve the quadratic equation $2x^2+5x+3=0$ by factorization method. [5 marks]

(b) Find the value of x in the equation $200(1.1)^x=20{,}000$ [5 marks]

(c) A plant grows 1.67 cm in its first week. Each week it grows by 4% more than it did in the week before. By how much does it grow in nine weeks including the first week? [4 marks]

(d) Solve the trigonometric equation $2\sin^2\theta=sin\theta \; for \; 0\le\theta\le360$ [6 marks]

QUESTION THREE

(a) From a group of 7 men and 6 women, five persons are to be selected to form a committee so that atleast 3 men are there in the committee. In how many ways can this be done? [5 marks]

(b) In how many ways can the letters of the word CORPORATION be arranged so that the vowels always come together? [5 marks]

(c) Given the set of data below

10.2, 7.8, 9, 13, 12, 11, 13.6, 12.5

Calculate

(i) Range [1 mark]

(ii) Q_1 and Q_3 [6 marks]

(iii) Standard deviation [3 marks]

QUESTION FOUR

(a) Let $f(x)=2x-1$

$g(x)=3x-2$

Find (i) $fog(2)$

(ii) $gof(2)$ [5 marks]

(b) Obtain the remainder when x^3-3x^2+6x+5 is divided by x-2 using the remainder theorem. Confirm your answer using the synthetic method. [5 marks]

(c) An AP has 3rd term 5 and 5th term 9. Find the first term and common difference. [5 marks]

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

$$f(x)=\begin{cases} 2x+5 \text{ if } x\leq 3 \\ x^2+1 \text{ if } 3<x\leq 5 \\ 4x-6 \text{ if } x>5 \end{cases}$$

Evaluate

(i) $f(1)$

(ii) $f(0)$

(iii) $f(5)$

(iv) $f(10)$ [5 marks]

QUESTION FIVE

(a) The following data relates to the marks scored by students in a mathematics test

Score	Frequency
0 – 10	5
10 – 20	8
20 – 30	11
30 – 40	15
40 – 50	13
50 – 60	6
60 - 70	2

Calculate

(i) Mean score
(ii) Median mark
(iii) Mode
(iv) 64^{th} percentile
(v) 7^{th} decile
(vi) Quartile deviation
(vii) Standard deviation [15 marks]

(b) Slips numbered 1 through 9 are placed in a box. If two slips are drawn without replacement, what is the probability that

(i) Both are odd

(ii) Both are even [5 marks]
