CHUKA **UNIVERSITY**

UNIVERSITY EXAMINATIONS

FIRST YEAR EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE IN LIBRARY SCIENCE (MAIN CAMPUS)

MATH 100: GENERAL MATHEMATICS

Instructions: Answer Question One and any other TWO Questions in Section B

SECTION A

QUESTION ONE (30 MARKS)

a) List all possible sets of real numbers in which all the following numbers belong
   i) $\sqrt{5}$ (1 mark)
   ii) 16 (1 mark)
   iii) -16 (1 mark)
   iv) 0 (1 mark)
   v) -3.333 (1 mark)

b) Find the values of x in the following functions
   i) 2logx=4log3 (2 marks)
   ii) $log_2(x-1)=5$ (2 marks)
   iii) $log_3(x-2)^3=\frac{1}{3}log_3(4x+7$ (3 marks)

c) Find the mean, mode, median, range, and standard deviation of the following data 30,50,30,70,20,50,30 (8 marks)

d) The function $f(x)=ax^2+x-7$ has a remainder of *3* when divided by $(x-2)$. Find the value of 'a' (2 marks)

e) Given f(x)=3x+2, g(x)=x+5, find fog(x) (2 marks)

f) Find $\frac{dy}{dx}$ for
   i) $y=18x^6+9x^3-\frac{1}{4x}$ (3 marks)
   ii) $y=\sqrt[3]{x}+\frac{4}{x^3}$ (3 marks)

SECTION B

QUESTION TWO (20 MARKS)

Consider the following data representing the age of 100 people randomly selected in Chuka town.

Age	Frequency
0-9	5
10-19	8
20-29	7
30-39	12
40-49	28
50-59	20
60-69	10
70-79	10

Determine;

i) Mean (2 marks)
ii) Mode (3 marks)
iii) Median (3 marks)
iv) 75^{th} percentile (3 marks)
v) 7^{th} decile (3 marks)
vi) Semi-interquartile range (3 marks)
vii) Standard deviation (3 marks)

QUESTION THREE (20 MARKS)

a) Given $f(x) = 5x - 1$, $g(x) = x^2 + 4x$, $k(x) = \frac{1}{x-3}$. Find
   i) *(fog)(-2)* (4 marks)
   ii) *(gof)(-2)* (4 marks)
   iii) *(kof)(5)* (4 marks)
b) Find the value of x in $ax^2 + bx + c = 0$ using completing square method (8 marks)

QUESTION FOUR (20 MARKS)

a) The expression $x^3 + kx^2 - 2x - 4$ is fully divisible by (x+1)
   i) Find the value of k
   ii) Use the long division method to confirm this result and hence solve the equation by using the value of k obtained in i) above (8 marks)
b) Solve the following equations
   i) $2x^2 - 5x - 3 = 0$(factorization method) (3 marks)
   ii) $2x^2 + 5x = 3$(completing square method) (3 marks)
   iii) $9x^2 + 7x - 1 = 0$(quadratic formula method) (3 marks)

QUESTION FIVE (20 MARKS)

a) Simplify $log\sqrt[3]{\frac{x^2y}{z^4}}$ (3 marks)

b) Find the value of x in the following log functions

i) $log_2(x-3)+log_2(x-1)=3$ (3 marks)

ii) $log_3(2x+1)+log_3(x+8)=3$ (3 marks)

c) Find the derivatives of the following functions

i) $p(x)=(x^2+2)(3x^2-5x)$ (3 marks)

ii) $\mathrm{Q}(x)=\frac{5x^2}{4x+3}$ (3 marks)

iii) $h(t)=\left(\frac{2t+3}{6-t^2}\right)^3$ (5 marks)