KISII UNIVERSITY
UNIVERSITY EXAMINATIONS

FIRST AND SECOND YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN MATHEMATICS
SECOND AND FIRST SEMESTER 2021/2022
(FEBRUARY-JUNE, 2022)

MATH 100: GENERAL MATHEMATICS

STREAM: Y1 S2, Y2 S1 **TIME: 2 HOURS**

DAY: THURSDAY, 12:00 PM – 2:00 PM **DATE: 19/05/2022**

INSTRUCTIONS:

1. ***Do not write anything on this question paper.***
2. ***Answer Question ONE (compulsory) and any other TWO* Questions.**

QUESTION ONE (30 MARKS)

(a) Find the quotient when $4y^4 + 4y^3 – y^2 + 7y – 4$ is divided by $(2y - 1)$. (4mks)

(b) The expression $y^3 + my^2 – 2y - 4$ is fully divisible by $(y + 1)$.

(i) Find the value of m (2mks)

(ii) Use the remainder theorem to find the remainder when the expression is divided by $(y + 2)$. (2mks)

(c) Express as single logarithms

(i) $2 \log_y m – 4 \log_y n$ (2mks)

(ii) $4 + 4 \log_c y$ (2mks)

(d) State the property of real numbers being applied in each of the following :

(i) If X = m and m = Y then X = Y (1mk)

(ii) $(x + y)z = xz + yz$ (1mk)

(iii) $4 + z = z + 4$ (1mk)

(iv) $6 \times 6^{-1} = 1$ (1mk)

(v) $8 \times 6 = 6 \times 8$ (1mk)

(e) (i) Find the value of n if $\left(\frac{27}{8}\right)^{n+7} = \left(\frac{4}{9}\right)^{-3n}$ (3mks)

(ii) Solve for x in the following equation: $27^x + 3^{3x-1} = 108$ (3mks)

(iii) Solve for x in the equation: $16^{(2x - 1)} \times 32^x = 64^{(x + 1)}$ (4 mks)

QUESTION TWO (20 MARKS)

The table below shows the amount in shillings of pocket money given to students in a particular school.

Pocket money (Kshs)	201 – 219	220 – 229	230 – 239	240 – 249	250 – 259	260 – 269	270 – 279	280 – 289	290 – 299
No. of students	5	13	23	32	26	20	15	12	4

Calculate the:

(a) Calculate the mean amount of pocket money given to these students to the nearest shilling.(4 mks)
(b) The median (3 mks)
(c) Interquartile range (3 mks)
(d) 7^{th}decile (3 mks)
(e) 60^{th} percentile (3 mks)
(f) Standard deviation (4 mks)

QUESTION THREE (20 MARKS)

(a) Letting D = {2, 3, 4, 5, 7, 10}as the domain, find the range for each of the following functions

(i) $f(x) = 3x + 2$ (2 mks)
(ii) $g(x) = x^2 - 1$ (2 mks)

(b) Given that $f(x) = 5x – 3$ and $g(x) = \frac{1}{4}x + 1$, evaluate

(i) $(f + g)(3)$ (2mks)
(ii) $2f(x) – g(2x)$ (2 mks)

(a) Given $f(x) = 5x + 1$ and $g(x) = \frac{x}{3} – 1$,

(i) Determine $(f \circ g)(x)$ (2 mks)
(ii) Find $f^{-1}(x)$ and $g^{-1}(x)$ (4 mks)
(iii) Verify that $(f \circ g)^{-1} = (g^{-1} \circ f^{-1})$ (6 mks)

QUESTION FOUR (20 MARKS)

(a) Find the equations of the tangent and the normal to the curve $y = x^2 – 2x -1$ at the point (3, 2). (5mks)

(b)Given the function $y = 25x – 3x^3$, find the stationary points and distinguish between them. (5mks)

(c) Find the turning points on the curve $y = x^3 – 3x + 1$. Sketch the curve. (10mks)

QUESTION FIVE (20 MARKS)

(b) Differentiate from first principles $f(x) = 2x^2 + x - 2$. (6mks)

(c) Differentiate the following using appropriate rules of differentiation

(i) $x = \sqrt[3]{y}$ (3 mks)

(ii) $x = (y^2 + 3y - 5)^3$ (3 mks)

(iii) $x = (y^2 + 3y^3)(\frac{1}{3}y^4 - y^2)$ (4 mks)

(iv) $x = \frac{bx+c}{dx+e}$ (4 mks)