Kasarani Campus
Off Thika Road
Tel. 2042692 / 3
P. O. Box 49274, 00100
NAIROBI
Westlands Campus
Pamstech House
Woodvale Grove
Tel. 4442212
Fax: 4444175

KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATION, 2020/2021 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(MATHEMATICS)

Date: 11th December, 2020
Time: 11.30am – 1.30pm

KMA 100 - FOUNDATION MATHEMATICS

INSTRUCTIONS TO CANDIDATES

ANSWER **QUESTION ONE (COMPULSORY)** AND **ANY OTHER TWO** QUESTIONS

QUESTION ONE (30 MARKS)

a) Define the following terms as used in foundation mathematics
   i) Surd (2 Marks)
   ii) Rational numbers (2 Marks)
   iii) Logarithm (2 Marks)

b) Express $3\sqrt{\frac{81}{625}}$ in the form $p\sqrt[3]{q}$ for rational numbers p where q contains no factors which are exact cubes of rational numbers. (2 Marks)

c) Find y in terms of x if $\log\left(\frac{x^2}{y}\right) = 5 - 2\log x$ (3 Marks)

d) Expand $(5-3x)^7$ up to the term containing x^2. (3 Marks)

e) Solve the following quadratic equation by the method of completing the square
$2x^2 + 8x - 25 = 0$ (4 Marks)

f) Show that $2\sin B\cos A = \sin(A+B) - \sin(A+B)$ (3 Marks)

g) Simplify $\dfrac{(1+x)^{\frac{1}{3}} - \frac{1}{3}x(1+x)^{-\frac{2}{3}}}{(1+x)^{\frac{2}{3}}}$ (5 Marks)

h) Solve for x if $\log_3 x + \log_9 x^2 = 6$ (4 Marks)

QUESTION TWO (20 MARKS)

a) Obtain the first four terms of the expansion $\left(1+\frac{1}{6}x\right)^{10}$ in ascending powers of x. Hence, find the value of $(1.005)^{10}$, correct to four decimal places. (8 Marks)

b) Given that $\sqrt{35}=5.9160798$ correct to seven decimal places, evaluate $\frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}$ correct to six decimal places without use of tables or calculator.

(6 Marks)

c) Solve the equation $\log_x 2 + 48 \log_2 x = 14$, giving your answer to three significant figures.

(6 Marks)

QUESTION THREE (20 MARKS)

a) A polynomial $f(x)$ has remainder 9 when divided by $x-3$ and remainder -5 when divided by $2x+1$. Find the remainder when divided by $(x-3)(2x+1)$.

(8 Marks)

b) Show that $\tan(A+B)=\frac{\tan A+\tan B}{1-\tan A\tan B}$

(8 Marks)

c) Simplify $\frac{\log 125}{\log 25}$

(4 Marks)

QUESTION FOUR (20 MARKS)

a) If $0<x<\prod$ and $\tan(X-A)=3$, where $\tan A=2$, show that $x=\frac{3}{4}\prod$ without using tables.

(8 Marks)

b) Calculate the remaining side and angles of triangle ABC in which c=12 cm, a=8 cm, and angle A=30^0. (6 Marks)

c) How many even numbers greater than 60 000 can be formed using the digits 0, 3, 4, 5, 6, and 7
   i) Without repeating digits
   ii) If repeating digits is allowed?

(6 Marks)

QUESTION FIVE (20 MARKS)

a) Draw the graph of $y=2x^2-12x+19$ for $1\le x\le 5$. By adding suitable lines to your graph
   i) Solve the equation $x^2-6x+6=0$

(5 Marks)

   ii) Solve the equation $4x^2-25x+28=0$

(5 Marks)

b) Solve $ax^2+bx+c=0$ by completing the square method where a, b and c are real numbers and $a\neq 0$.

(10 Marks)