



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, 2024/2025 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(MATHEMATICS AND COMPUTER SCIENCE)

Date: 9th April, 2024
Time: 8.30am –10.30am

KMA 100 - FOUNDATION MATHEMATICS

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

- a) Simplify $\frac{\sqrt[5]{xy} \times x^{\frac{1}{4}} \times 2y^{\frac{1}{5}}}{(x^8 y^7)^{\frac{1}{14}}}$ (4 marks)
- b) Simplify without using tables or calculator $3\cos^2 45^\circ \cos 42^\circ + \tan^2 60^\circ \sin 48^\circ - 9\cos 60^\circ \cos 42^\circ$. (4 marks)
- c) The roots of the equation $x^2 + 6x + q = 0$ are α and $\alpha - 1$. Find the value of q . (3 marks)
- d) Express $\alpha^3 + \beta^3$ in terms of $\alpha + \beta$ and $\alpha\beta$ (3 marks)
- e) Determine the number of permutations of the letters of the word **MISSISSIPPI**. (3 marks)
- f) State the quotient and the remainder when $6x^3 - 8x + 5$ is divided by $2x - 4$. (3 marks)
- g) Simplify $(5\sqrt{2} + 3\sqrt{3})(4\sqrt{2} - 5\sqrt{3})$ (3 marks)
- h) A committee of six is to be formed from nine women and three men. In how many ways can the members be chosen so as to include at least one man? (4 marks)
- i) Determine the smallest number of terms of the G.P $8 + 24 + 72 + \dots$ whose sum exceeds 10,000,000 (3 marks)

QUESTION TWO (20 MARKS)

- a) Find the first four terms in the expansion of $(1-8x)^{\frac{1}{2}}$ in ascending powers of x hence, substitute $x = \frac{1}{100}$ and obtain the value of $\sqrt{23}$ correct to 5 significant figures. (8 marks)
- b) The expression $ax^2 + bx + c$ is divisible by $x-1$, has remainder 2 when divided by $x+1$, and has remainder 8 when divided by $x-2$. Find the values of a, b, c . (4 marks)
- c) Evaluate $\frac{\sqrt{7} - \sqrt{5}}{\sqrt{7} + \sqrt{5}}$ correct to 6 d.p given that $\sqrt{35} = 5.9160798$ (6 marks)

QUESTION THREE (20 MARKS)

- a) Rationalize the denominator in $\frac{3}{\sqrt[3]{5} - 2}$ (4 marks)
- b) Expand $\frac{4}{(1+4x)(1-2x)}$ as far as the term in x^3 stating the range of values of x for which the expansion is valid (8 marks)
- c) A single deposit of Ksh. 150,000 is invested for four years at a compound interest. Determine the rate at which the investment will be Ksh. 182,326 (4 marks)
- d) Find y in terms of x if $\log_{10}\left(\frac{x^2}{y}\right) = 5 - 2\log_{10} x$ (4 marks)

QUESTION FOUR (20 MARKS)

- a) If $0 < x < \pi$ and $\tan(X - A) = 3$, where $\tan A = 2$, show that $x = \frac{3}{4}\pi$ without using tables. (5 marks)
- b) Show that the terms of $\sum_{r=1}^n \log 5^r$ are in A.P and hence find the sum of the first twenty terms of the series (7 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. (4 marks)
- ii) If repeating digits is allowed? (4 marks)

QUESTION FIVE(20 MARKS)

- a) The second and fifth terms of an arithmetic series are 26 and 41 respectively.
- i) Show that the common difference of the series is 5 (4 marks)
- ii) Find the 12th term of the series (3 marks)
- iii) Another arithmetic series has first term -12 and common difference 7. Given that the sums of the first n terms of these two series are equal, find the value of n . (4 marks)
- b) Use the Pascal's triangle to expand $(2x-3)^7$ (5 marks)
- c) Find the value of $\log_3 \frac{1}{27}$ (4 marks)