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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
(MATHEMATICS AND COMPUTER SCIENCE)

Date: 2nd August, 2022
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 $3\cos^2 45 \cos 42 + \tan^2 60 \sin 48 - 9\cos 60 \cos 42$ (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 . (6 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 $\frac{3}{\sqrt[3]{5}-2}$ (6 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 if the interest is compounded annually. (6 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. (7 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 and also the least value of n for which the sum to n terms exceed 400 . (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? (7 marks)

QUESTION FIVE (20 MARKS)

- a) Draw the graph of $y = x^2 - 12x + 19$ for $1 \leq x \leq 5$. By adding suitable lines to your graph
i) Solve the equation $2x^2 - 5x - 3 = 0$
ii) Solve the equation $5x^2 - 6x - 2 = 0$ (10 marks)
- b) Solve $ax^2 + bx + c = 0$ by completing the square method where a, b and c are real numbers and $a \neq 0$. Hence solve $x^2 - 14x + 49 = 0$. (10 marks)