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KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATION, 2022/2023 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE BACHELOR OF BUSINESS AND INFORMATION TECHNOLOGY

KMA 2103 - BASIC MATHEMATICS

Date: 14TH DECEMBER 2022
Time: 8:30a.m- 10:30a.m

INSTRUCTIONS TO CANDIDATES
ANSWER QUESTION ONE (COMPULSORY) AND ANY OTHER TWO QUESTIONS

QUESTION ONE (30 MARKS)

a) Find the value of $(0.04)^{-\frac{3}{2}}$ (4 Marks)

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

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) Show that $\sin 2A = 2\sin A\cos A$ (4 Marks)

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

e) The roots of the equation $x^2+6x+q=0$ are α and $\alpha-1$. Find the value of q.
(3 Marks)

f) Determine the number of permutations of the letters of the word **MISSISSIPPI**
(3 Marks)

g) State the quotient and the remainder when $6x^3-8x+5$ is divided by $2x-4$. (4 Marks)

QUESTION TWO (20 MARKS)

a) Evaluate $\dfrac{\sqrt{6}+\sqrt{3}}{\sqrt{6}-\sqrt{3}}$ (4 Marks)

b) Find the first four terms in the expansion of $(1-8x)^{\frac{1}{2}}$ in ascending powers of x. Hence, substitute $x=\dfrac{1}{100}$ and obtain the value of $\sqrt{23}$ correct to 5 significant figures
(6 Marks)

c) In an A.P, the thirteenth term is 27, and the seventh term is three times the second term. Find the first term, the common difference and the sum of the first ten terms. (6 Marks)

d) If the roots of the equation $3x^2+4x-5=0$ are α and β, find the equation with integral coefficients whose roots are $\alpha^2\beta$ and $\alpha\beta^2$ (4 Marks)

QUESTION THREE(20 MARKS)

a) Rationalize the denominator in $\dfrac{3}{\sqrt[3]{5}-2}$ (4 Marks)

b) Expand $\dfrac{4}{(1+4x)(1-2x)}$ as far as the term in x^3 stating the range of values of x for which the expansion is valid (8 Marks)

c) Write $\log\dfrac{a^6b^3}{1000\sqrt[5]{c}}$ in terms of $\log a$, $\log b$ and $\log c$ (4 Marks)

d) Determine the smallest number of terms of the G.P $8+24+72+\Lambda$ whose sum exceeds 10,000,000 (4 Marks)

QUESTION FOUR(MARKS)

a) Show that $\dfrac{\sin^2 315^\circ\left(1-\tan^2 210^\circ\right)}{\left(1+\cos 120^\circ\right)\left(1+\tan^2 330^\circ\right)}=\dfrac{1}{2}$ (4 Marks)

b) A customer makes deposits of *Ksh.*10,000 on first January every year for four years. How much is the investment worth at the end of the four years if it attracts a compound interest of 12% per annum? (6 Marks)

c) Show that $\tan(A+B)=\dfrac{\tan A+\tan B}{1-\tan A\tan B}$ (6 Marks)

d) Find the value of $\log_3\dfrac{1}{27}$ (4 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 $x^2-6x+6=0$

ii. Solve the equation $4x^2-25x+28=0$ (10 Marks)

b) Use the Pascal's triangle to expand $(2x-3)^7$ (5 Marks)

c) 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? (5 Marks)