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KIRIRI WOMENS' UNIVERSITY OF SCIENCE AND TECHNOLOGY
UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR
FIRST YEAR, FIRST SEMESTER EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE IN COMPUTER SCIENCE

KMA 2100 FOUNDATION MATHEMATICS

Date: 15TH AUGUST, 2024
Time: 11:30 AM – 1:30 PM

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

QUESTION ONE: COMPULSORY (30 MARKS)

a) Expand $(\mathbf{2}+\boldsymbol{x})^{\mathbf{6}}$ up to and including term in $\boldsymbol{x}^{\mathbf{3}}$. Hence evaluate $\mathbf{2.01}^{\mathbf{6}}$ giving your answer correct to 5 decimal places. **(4 Marks)**

b) A committee of ten is to be formed from nine men and six women. In how many ways can it be formed if at least four women are to be in the committee? **(3 Marks)**

c) Find how many different arrangements of 14 letters can be obtained from the letters of the word **FUNDAMENTALISM** **(2 Marks)**

d) Given that $log_b c = a$, $log_c a = b$ and $log_a b = c$. Show that $abc = 1$. **(3 Marks)**

e) The roots of the equation $5x^2 + 12x + 6 = 0$ are α and β. Find the equation of the integral coefficients whose roots are $(\alpha - 1)$ and $(\beta - 1)$. **(4 Marks)**

f) Use completing the square method to solve for x in the function $2x^2 - 11x + 22 = 10$. **(4 Marks)**

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

h) 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 $(x - 3)(2x + 1)$. **(3 Marks)**

i) Simplify $\frac{\sqrt{xy} \times x^{\frac{1}{3}} \times 2y^{\frac{1}{4}}}{(x^{10}y^{9})^{\frac{1}{12}}}$ **(3 Marks)**

QUESTION TWO: (20 MARKS)

a) Show that the solution of the general quadratic equation $ax^2 + bx + c = 0$ is given by $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$.

Hence solve the equation $-4x^2 + 15x - 3 = 0$. **(6 Marks)**

b) Simplify without using tables or calculator;

$4cos30^o sin27.59^o - 4sin\,45°cos62.41^o - 16tan45^o sin\,60^o$. **(4 Marks)**

c) Find the first four terms in the expansion of $\sqrt{1-8x}$ in ascending power of x. Hence, substitute $x = 0.01$ and obtain the value of 23 correct to four significant figures **(6 Marks)**

d) Solve the equation $log_{81} x + log_3 x + log_{\sqrt{3}} x = 13$ **(4 Marks)**

QUESTION THREE (20 MARKS)

a) How many even numbers greater than 50000 can be formed using the digits 0,3,4,5,6,7

(i) without repetitions **(6 Marks)**

(ii) if repetitions are allowed. **(4 Marks)**

b) Find the first four terms in the expansion of $(1-8x)^{\frac{1}{3}}$ in ascending powers of x. Hence, substitute $x = \frac{1}{100}$ and obtain the value of $\sqrt[3]{23}$ correct to 5 significant figures. **(6 Marks)**

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

QUESTION FOUR: (20 MARKS)

a) In how many ways can a committee of 7 be selected from 10 men and 7 women if there must be a majority of women serving? **(5 Marks)**

b) Evaluate $\frac{\sqrt{7}-\sqrt{5}}{\sqrt{7}+\sqrt{5}}$ correct to 6 $d.p$ given that $\sqrt{35} = 5.9160798$. **(4 Marks)**

c) 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? **(5 Marks)**

d) Show that $\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$. **(6 Marks)**

QUESTION FIVE: (20 MARKS)

a) In an arithmetic progression the 4^{th} term is 13 and the 7^{th} term is 22. Find;

i. The first term and the common difference. **(3 Marks)**

ii. The value of *n* if the n^{th} term is 100. **(4 Marks)**

iii. The value of m if the sum of m terms of the series is 175. **(4 Marks)**

b) Use the Pascal's triangle to expand $(2x-7)^5$ **(4 Marks)**

c) When a polynomial $f(x)$ is divided by $(x-1)$, the remainder is 3. When $f(x)$ is divided by $(x+1)$, the remainder is 5. When $f(x)$ is divided by $(x-2)$, the remainder is 20. Find the remainder when $f(x)$ is divided by $(x^2-1)^2(x-2)$. **(5 Marks)**