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**KIRIRI WOMEN'S UNIVERSITY OF SCIENCE AND TECHNOLOGY**
**UNIVERSITY EXAMINATIONS, 2024/2025 ACADEMIC YEAR**
**END OF SEMESTER EXAMINATIONS**
**FOR THE DEGREE OF BACHELOR OF BUSINESS INFORMATION TECHNOLOGY SPECIAL**
**KMA 2313 MANAGEMENT MATHEMATICS**

**Date: August 12, 2024**
**Time: 11:30 am- 1:30pm**

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

**QUESTION ONE COMPULSORY (30 MARKS)**

a) If $A = \{2, 3, 4, 5, 6, 7\}$ and $B = \{3, 5, 7, 9, 11, 13\}$ find
   i. $A - B$ (1 Marks)
   ii. $A^c$ and $B^c$ (2 Marks)

b) Evaluate the following integrals
   i. $\int \sin^2 x \cos^2 x \, dx$ (4 Marks)
   ii. $\int \frac{3x+11}{x^2-x-6} dx$ (4 Marks)

c) Find the derivative of the following functions
   i. $f(x) = \frac{2x^2+1}{x^2+1}$ (4 Marks)
   ii. $y = \sin^{-1} x$ (4 Marks)

d) Solve the following simultaneous linear equations
   $5x + 2y = 14$
   $3x - 4y = 24$ (4 Marks)

e) Write down the $8^{th}$ term in the geometric progression $1, 3, 9 \ldots$ (3 Marks)

f) If $\ln(2x - 1) = 2\ln x$ solve for $x$ (4 Marks)

**QUESTION TWO (20 MARKS)**

a) For the following problem find the points where given function is not defined and therefore not continuous. For each such point a, tell whether the discontinuity is removable
   $f(x) = \frac{x-2}{x^2-3x+2}$ (5 Marks)

b) Find the derivative of $f(x) = sinx$ using the first principle (6 Marks)

c) Find the integral of $\int x^2 e^x \, dx$ (9 Marks)

**QUESTION THREE (20 MARKS)**

a) Solve for $x = \sqrt{19 - 2x} + 2$ (6 Marks)

b) Show that the equation of the tangent $to\ x^2 + xy + y = 0$ at the point $(x_1, y_1)$ is $(2x_1 + y_1)x + (x_1 + 1)y + y_1 = 0$ (10 Marks)

c) If $A = \{3, 4, 5, 6\}$ and $B = \{1, 2, 4, 5\}$ use the Venn diagram to represent

i. $A \cap B$ (2 Marks)

ii. $A - B$ (2 Marks)

**QUESTION FOUR (20 MARKS)**

a) Evaluate $\int \sin^3 x\, dx$ (5 Marks)

b) Solve $\log_4 x + \log_4(x - 12) = 3$ (5 Marks)

c) Find the maximum and minimum ordinates of the curve $y = x^2\ (x + 1)$ (6 Marks)

d) Add up the first 10 terms of the arithmetic series $\{1, 4, 7, 10, 13, \ldots\}$ (4 Marks)

**QUESTION FIVE (20 MARKS)**

a) Find $\frac{dy}{dx}$ if $y = \sqrt{\frac{1+x}{1-x}}$ (6 Marks)

b) Find the integral of $\int \frac{1}{\sqrt{2x+1}}\, dx$ (5 Marks)

c) Solve $\log_6(x + 4) + \log_6(x - 2) = \log_4 4x$ (6 Marks)

d) Let $A = \{y, z\}$ and $B = \{x, y, z\}$ find

i. $A \cap B$ (1 Marks)

ii. $A \cup B$ (1 Marks)

iii. $A^c$ (1 Marks)