



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCES**

**UNIVERSITY EXAMINATION FOR BSC. COMMUNITY HEALTH AND
DEVELOPMENT**

1st YEAR 2ND SEMESTER 2018/2019 ACADEMIC YEAR

KISII CAMPUS

COURSE CODE: SMA 3112

COURSE TITLE: MATHEMATICS II

EXAM VENUE

DATE

TIME :2HRS

STREAM : BSC (PUBLIC HEALTH

EXAM SESSION:

INSTRUCTION

1. Answer question 1(COMPULSORY) and any other 2 questions
2. Candidates are advised not to write on the question paper
3. Candidates must hand in their answer booklet to the invigilator while in the examination room

QUESTION ONE

a)

i. Determine $\frac{dy}{dx}$ given that $y = \tan(8x + 2)$

ii. Evaluate $\int 2x^2 - 5x^2 + 6x - 9$ (5mks)

b) Given $A = \begin{pmatrix} 2 & 7 & 6 \\ 3 & 1 & 5 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 0 \\ 3 & 7 \\ 1 & 5 \end{pmatrix}$

Find $(AB)^T$ (4mks)

c) evaluate

$\lim_{x \rightarrow -1} \left(\frac{2x^2 + 4x + 2}{2x^2 + 6x + 4} \right)$ (4mks)

d) Evaluate

$\begin{vmatrix} 8 & 4 \\ 10 & 6 \end{vmatrix}$ (3mks)

e) Solve $18\cos^2 x + 3\cos x - 1 = 0$ (4mks)

f) Simplify and solve the following system of equation

$$2(x + 2y) - 3(x + 2z) - 4(y - 2z) = 1$$

$$3(2x - y) + 2(3y - 4z) - 5(3x - 2z) = -7$$

$$-(x - y) + (x - z) + (y + z) = -2$$
 (4mks)

g)

i. Differentiate $y = \sin(2x - 3)$ (3mks)

ii. Solve $9\cos^2x + 6\cos x - 1 = 0$ (3mks)

QUESTION TWO

a) using matrices solve the following linear systems

$$\begin{aligned} x + 2y + z &= 3 \\ 2x + 5y - 7 &= -4 \\ 3x - 2y - z &= 5 \end{aligned} \quad (6\text{mks})$$

b) Integrate

$$y = \int (6x + 8)^4 dx \quad (5\text{mks})$$

c) Evaluate

$$\lim_{x \rightarrow \pi/2} [2x^2 \cos(3x - \pi/2)] \quad (5\text{mks})$$

d) Solve the pair of equations

$$\begin{aligned} \frac{6}{x - 2y} - \frac{15}{x + y} &= 0.5 \\ \frac{12}{x - 2y} - \frac{9}{x + y} &= -0.4 \end{aligned} \quad (4\text{mks})$$

QUESTION THREE

a) Analyze the continuity of

$$f(x) = 6 \text{ Given that}$$

$$f(x) = 2x + 14, \quad 0 \leq x \leq 10$$

(4mks)

b) Find the area enclosed between the x-axis and the curve $y = x^3 + 2x^2 + x + 1$ between $x = -1$ and $x = 2$

(5mks)

c) If $y = -4^4 - 6x^3 - 6x^3 + 8x^2 - 2x + 10$ obtain the expression $\frac{dy}{dx}$ at $x = -6$

(5mks)

d) Simplify each side separately and hence determine the solution

$$\frac{x - 2}{x - 4} - \frac{x - 4}{x - 6} = \frac{x - 1}{x - 3} - \frac{x - 3}{x - 4}$$

(6mks)

QUESTION FOUR

a) Use co-factor method to find the inverse of $A = \begin{bmatrix} 4 & 6 & 10 \\ 8 & 2 & 12 \\ 2 & 8 & 0 \end{bmatrix}$

(6mks)

b) Determine $I = \int (9x^3 + 11x^2 - x - 3)dx$ given that $x=1$ and $I=2$

c) Find the area bounded by the curve

$$y = 3x^2 + 6x + 8$$

(5mks)

, the x - axis and the ordinates $x = 1$ and $x = 3$

d) Solve $\frac{4}{x+11} + \frac{7}{4(2-y)} = 9$

$$\frac{3}{2}(x+1) + \frac{7}{(2-y)} = 7$$

(4mks)

QUESTION FIVE

a) Evaluate

$$\lim_{x \rightarrow \frac{\pi}{4}} (6x - \tan x)$$

(5mks)

b) Find the area enclosed between x -axis and the curves

(5mks)

$$2y = 2x^2 - 50 \text{ for } -10 \leq 2x \leq 10$$

c) Find the points of inflexion on the graph of the function

$$y = 3x^2 - 5x^4 + x + 4$$

(5mks)

d) Given $A = \begin{pmatrix} 2 & 8 & 6 \\ 12 & 4 & 10 \\ 2 & 14 & 0 \end{pmatrix}$

Determine $|A|$ and $\text{adj } A$

(5mks)