



**JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY**  
**SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE**  
**UNIVERSITY EXAMINATION FOR DEGREE OF B.sc. (CUMMUNITY HEALTH AND**  
**PUBLIC HEALTH)**  
**1<sup>ST</sup> YEAR SEMESTER 2018/2019 ACADEMIC YEAR**  
**KISUMU/KISII LEARNING CENTRES**

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**COURSE CODE : SMA 3121**  
**COURSE TITLE : MATHEMATICS II**  
**EXAM VENUE : STREAM: Bsc Community Health / Public Health**  
**DATE : -- 08/19**  
**TIME : 2.00HRS EXAM SESSION: ----- AM/PM**

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**Instructions**

- 1. Answer question One (compulsory) and ANY other two questions**
- 2. Candidates are advised not to write on the question paper.**
- 3. Candidates must hand in their answer booklets to the invigilator while in the examination room.**

**QUESTION ONE COMPULSORY (30 MARKS)**

a) Differentiate  $y = \frac{6x^3 + 14x^2 - 12x}{3x - 2}$  (5mks)

b) Use matrix to solve  
 $2x + 3y = 600$   
 $x + 2y = 350$  (5mks)

c) Evaluate  $\int \frac{2x+3}{x^2+3x+4}$  (5mks)

d) Using co-factor method, solve the following system of linear equations  
 $2x + 4y + 6z = 10$   
 $4x - 6y - 2z = 6$   
 $-6 + 8y + 10z = 6$  (5mks)

e) Given the co-ordinates of A and B as (2,2) and (10,2) respectively, find the equation of the perpendicular bisector of AB (5mks)

f) Given that;

$B = \begin{bmatrix} 4 & 1 & 0 \\ 2 & -3 & 1 \\ 0 & 2 & 3 \end{bmatrix}$  and  $M = \begin{bmatrix} 6 & 3 & 0 \\ 0 & 1 & -2 \\ -3 & 3 & 1 \end{bmatrix}$

Find  $\frac{1}{3}M - \frac{1}{2}B$

**QUESTION TWO (20 MARKS)**

A Triangle has vertices A (2, 5), B (1,-2) and C (-5,1). Determine;

a) The equation of the line BC. (5mks)

b) The equation of the perpendicular line from A to BC. (5mks)

c) Find the equation of a line whose x-intercept is - 8 and y - intercept is 6. (5mks)

d) Draw the graph of a line passing through (3, -4) and has a gradient of 2. (5mks)

**QUESTION 3 (20 MARKS)**

Consider the matrix given below;

$A = \begin{bmatrix} 1 & 1 & -1 \\ 1 & 2 & -2 \\ -2 & 1 & 1 \end{bmatrix}$

i) Find the co-factors of matrix A (2mks)

ii) Find the determinant of the matrix (2mks)

iii) Determine the adjoint of the matrix A (4mks)

iv) Hence, find the inverse of matrix A (2mks)

v) Using the matrix in (iv) above, solve the system of equations below;

$$x+y-z=7$$

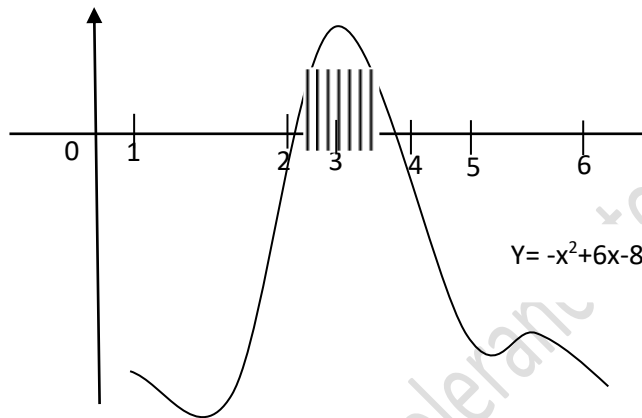
$$x+2y-2z=12$$

$$-2x+y+z=-3$$

(10mks)

#### QUESTION 4 (20 MARKS)

a) Calculate the shaded area in the figure below



(8 mks)

b) The velocity  $V$  of a particle is  $4\text{m/s}$ . Given that  $s = 5$  when  $t = 2$  second

i) Find the expression of displacement in terms of time (4mks)

ii) Find the

a) distance moved by the particle during the fifth second, (4mks)

b) distance moved by the particle between  $t = 1$  and  $t = 3$ . (4mks)

#### QUESTIONS 5 (20 MARKS)

a) Evaluate  $\int_1^6 (x^2 - 12x + 10) dx$  (6mks)

b) As blood moves from the heart through the major arteries out to the capillaries and back through the veins, the systolic blood pressure continuously drops. Consider a person whose systolic blood pressure  $P$  (in millimeters of mercury) is given by

$$P = \frac{25t^2 + 125}{t^2 + 1}, \text{ find the rate at which the systolic pressure is increasing when } t = 3\text{s}$$

(8mks)

c) Find the derivative of;

$$f(x) = \ln(x(x^2+1)^2)$$

(6mks)