![Meru University logo]

MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

P.O. Box 972-60200 – Meru-Kenya.
Tel: +254 (0)799529958, +254 (0)799529959, +254 (0)712524293
Website: www.must.ac.ke Email: info@must.ac.ke

University Examinations 2023/2024

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR THE DIPLOMA/CERTIFICATE IN INFORMATION TECHNOLOGY

SMA 1110/ SMA 2110: MATHEMATICS

DATE: APRIL 2024   TIME: 1¹/2 HOURS

INSTRUCTIONS:
1. Answer Question ONE, and any other TWO

QUESTION ONE (30 MARKS)

a) Define the following terms as used in mathematics: (3 marks)

      i.   Ratio

      ii.   series

      iii.   Rate

b) Find the angle between the vectors $a = (4,2,6)$ and $b = (3,5,1)$ (3 marks)

c) Differentiate $6x^4 + 14x^3 - 3x^2 + 2x - 1$ with respect to x   (3 marks)

d) Evaluate $\int (4x + 6)dx$ (3 marks)

e) Evaluate the value of x in the following:

      i. $5^x = 125$ (2 marks)

      ii. $x^4 = 81$ (3 marks)

f) The area of a triangle is 54cm². If one of its lengths is 12cm long, Find its perimeter

    (3 marks)

g) Given $a = (4,5,9)$ and $b = (4,6,2)$ Find:

      i. a.b   (2 marks)

   ii. ***a+b***   (2 marks)

   iii. the angle between ***a*** and ***b***   (3 marks)

h) How many terms are in the geometric progression 2,4,8,…,128

                          (3 marks)

QUESTION TWO – 15 MARKS

a) Given the arithmetic series 1,3,5,7,9,…

    Find: i) the common difference   (2 marks)

       ii) the sum of the first 50 terms   (3 marks)

b) Solve the simultaneous equation below using **substitution method**

                  (4 marks)

$$x + y = 1$$

$$x + 2y = 2$$

c) Find the sum of the series 1+3.5+6+8.5+…+101   (6 marks)

QUESTION THREE – 15 MARKS

a) Given $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ 1 & 1 \end{bmatrix}$ evaluate the following:

    i. AB   (2 marks)

    ii. A-B   (2 marks)

    iii. |A| (2 marks)

    iv. BA   (2 marks)

    v. A+B   (2 marks)

b) The area of a rectangle and the area of a circle are equal. If the dimensions of the rectangle are 14cm*11cm, Find the Perimeter of the circle

                          (5 marks)

QUESTION FOUR – 15 MARKS

a) Solve the quadratic equation $x^2 + 5x + 6 = 0$ (3 marks)

b) Find the mean deviation from mean of the following data (6 marks)

Size of items	4	6	8	10	12	14	16
frequency	2	5	5	3	2	1	4

c) A sphere has a diameter of 14 cm

    i. Find its surface area (3 marks)

    ii. Find its volume (3 marks)