



STRATHMORE INSTITUTE
DIPLOMA IN BUSINESS MANAGEMENT
DIPLOMA IN INTERNATIONAL RELATIONS
DIPLOMA IN JOURNALISM AND NEW MEDIA
DIPLOMA IN BUSINESS CREATION AND ENTREPRENEURSHIP
END OF SEMESTER EXAMINATION
DBM 1204/ DIR1202 /DE 1105/ DJNM1202
BUSINESS MATHEMATICS

DATE: Friday, 14th April, 2023

Time: 2 Hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.
3. Do not write on the question paper.

QUESTION ONE [30 MARKS]

- a) Identify each of the following types of matrices:

i.
$$W = \begin{pmatrix} 3 & 0 & 0 \\ 0 & 3 & 0 \\ 0 & 0 & 3 \end{pmatrix}$$

ii.
$$X = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

iii.
$$W = \begin{pmatrix} 4 & 0 & 0 \\ 0 & 8 & 0 \\ 0 & 0 & 2 \end{pmatrix}$$

iv.
$$Z = \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

[4 Marks]

b) Solve the following simultaneous equation:

$$\begin{aligned}4x + 5y &= 11 \\10x + 3y &= 18\end{aligned}$$

[4 Marks]

c) Without using mathematical tables, solve for x in the equation.

$$9^{(2x-1/4)} \times 27^{(x-1/2)} = 729^{(x+1/3)}$$

[4 Marks]

d) Find the sum of all the numbers between 4 and 208 which are exactly divisible by 2.

[5 Marks]

e) There are 30 houses on a street. 16 of the houses have burglar alarm, 22 have a smoke alarm, and 10 houses have both a burglar alarm and smoke alarm.

i. Draw this information on a Venn diagram.

[3 Marks]

ii. How many houses have a burglar alarm but not a smoke alarm?

[2 Marks]

iii. How many houses have either a burglar alarm or smoke alarm?

[2 Marks]

f) Simplify

$$\frac{\log 27 - \frac{1}{2} \log 9}{\log 81 + \frac{1}{2} \log 9}$$

[3 Marks]

g) Determine the mean, mode and median for the following data:

3, 5, 8, 9, 3

[3 Marks]

QUESTION TWO [15 MARKS]

a) List the elements of the following sets

i. $A = \{x : x \in \mathbb{N}, 3 < x < 6\}$

[1 Mark]

ii. $B = \{x : x \in \mathbb{N}, x^2 + 1 = 10\}$

[1 Mark]

iii. $C = \{x : x \in \mathbb{N}, 7 + x = 4\}$

[1 Mark]

b) A slaughter house bought goats and bulls at *Ksh.* 1,200 and *Ksh.*15,000 each. They paid a total bill of *Ksh.* 135,000. If they double the number of goats and three bulls less, they would have saved *Ksh.* 15,000.

i. By using matrix method, determine the number of goats and bulls that were bought.

[8 Marks]

ii. The slaughter house sold the animals at a profit of 25% per goat and 30% per bull. Determine the amount of profit made.

[4 Marks]

QUESTION THREE [15 MARKS]

The table below shows the lengths in centimetres of 40 steel rods in a workshop.

Length in cm	32 – 34	35 – 37	38 – 40	41 – 43	44 – 46	47 – 49
Frequency	6	5	10	12	4	3

- a) Draw a histogram. [3 Marks]
- b) Determine the:
- i. Mode [3 Marks]
 - ii. Median [4 Marks]
 - iii. Mean [5 Marks]

QUESTION FOUR [15 MARKS]

- a) Given that $\begin{pmatrix} 2-a & -3 \\ -5 & 6+b \end{pmatrix} = \begin{pmatrix} -2 & -3 \\ -5 & 16 \end{pmatrix}$. Determine the values of a and b .

[2 Marks]

- b) Given the matrices $A = \begin{pmatrix} 1 & 0 & 1 \\ 2 & -2 & 1 \\ 1 & 2 & 1 \end{pmatrix}$ and $B = \begin{pmatrix} -2 & 1 & 1 \\ 3 & 0 & 1 \\ 1 & 2 & 1 \end{pmatrix}$, determine $AB - 4A + 3B$.

[6 Marks]

- c) Solve the following equation:

$$x^2 + 6x + 5 = 0$$

[4 Marks]

- d) Sales for a new magazine are expected to grow according to the equation

$$S = 200,000(1 - e^{-0.05t}), \quad \text{where } t \text{ is given in weeks.}$$

Calculate the number of magazines sold after 20 weeks.

[3 Marks]

QUESTION FIVE [15 MARKS]

- a) Let $U = \{\text{whole numbers from 1 to 15}\}$, $A = \{\text{factors of 12}\}$ and $B = \{\text{even numbers less than 15}\}$

I. List the elements of A and B .

[2 Marks]

II. Find:

i. $A \cap B$

[2 Marks]

ii. $A \cup B$

[2 Marks]

iii. $A - B$

[2 Marks]

iv. $n(A^c)$

[2 Marks]

- b) Solve for x in the equation: $\log(3x + 4) - \log(3 - x) = 1$

[5 Marks]

END