



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.

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

[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**