NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of Regional and Rural Development, Bachelor of Communication, Bachelor of Technology Public Management, Bachelor of Supply Chain Management, Bachelor of Office Management and Technology, Bachelor of Natural Resources Management, Bachelor of emergency Medical Care, Diploma in Vocational and Training, Bachelor of Tourism management, and Bachelor of Hospitality Management	

QUALIFICATION CODE: 07BRRD, 25BACO, 07BLSM, 07BOMT, 07BNTC, 24BPMN, 07BRCMC	**NQF LEVEL: 4**
COURSE NAME: BASIC MATHEMATICS	**COURSE CODE:** BMS411S
SESSION: JANUARY 2023	**PAPER :** THEORY
DURATION: 3 Hours	**MARKS: 100**

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER

EXAMINER:	DR. J MWANYEKANGE, MR. J AMUNYELA and MS. P NGHISHIDIVALI
MODERATOR:	MR G. MBOKOMA

INSTRUCTIONS

1. Answer ALL the questions in the booklet provided.
2. Show clearly all the steps used in the calculations.
3. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without a cover.

THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)

QUESTION 1(30 marks)

Write down the letter corresponding to the best option for each question in the answer booklet/sheet provided.

1.1   If $A = \begin{pmatrix} -2 & 3 \\ -2 & 4 \end{pmatrix}$, which of the following statements is false?   (3)

A. $|A| = -2$ B. $A^2 = \begin{pmatrix} 4 & 9 \\ 4 & 16 \end{pmatrix}$ C. $AI = A$ D. $-2A = \begin{pmatrix} 4 & -6 \\ 4 & -8 \end{pmatrix}$

1.2   The HCF of 128, 216, and 240 is   (3)

A. 12   B. 8   C. 16   D. 6

1.3   Evaluate the following:

1.3.1 $\sqrt[4]{\dfrac{82944}{4}} \div \dfrac{4^{-2}}{2^{-4}}$ (3)

A. 5184   B. 12   C. 3   D. 8.48

1.3.2 $\left[72 \div 2(-2-4) - 4\right] + (-25) \div -(3-8)$ (3)

A. -225   B. -15   C. -216   D. -7

1.3.3 $\sqrt[3]{\dfrac{x^{0.05}y^3}{xy}}$ given that $x = \dfrac{1}{2}$ and $y = \dfrac{1}{5}$ correct to 1 significant figure   (3)

A. 0.6   B. 1   C. 0.2   D. 0.4

1.4   A copy machine can duplicate 2400 copies in one hour. How many copies can it make per minute (in 1 minute)?

A. 40 copies   B. 60 copies   C. 240 copies   D. 10 copies (3)

1.5 $\dfrac{(2a^{-5}b^4c^3)^{-2}}{(3a^3b^{-7}c^{-3})^2}$ simplifies to   (3)

A. $\dfrac{1}{36}a^4b^6$ B. $\dfrac{4}{9}a^4b^6c^{-12}$ C. $\dfrac{1}{36}a^4b^6c^{-12}$ D. $\dfrac{4}{9}a^4b^6$

1.6   Expand and simplify $4ab^2 + (2ab - b)^2$ (3)

A. $4a^2b^2 + b^2$ B. $4ab^2 + 4a^2b^2 - b^2$ C. $4a^2b^2$ D. $4a^2b + 8a^2b^2 - b^2$

1.7 Which of the following statements is false? (3)

A. $(-3)^4 = 81$ B. $3^{-2} = -9$ C. $(6^2)^5 = 6^{10}$ D. $\dfrac{n^6}{n^{-2}} = n^8$

1.8 Melissa went shopping and spent half of her money on food, a third on her rent, and a tenth to pay her telephone bill. If she remained with N$200, how much did she had in the beginning? (3)

A. N$1120   B. N$3000   C. N$1200   D. N$3200

QUESTION 2(12 marks)

The answers to this question should be written in the answer booklet/sheet provided. Ensure that all your calculations are shown neatly, systematically and legibly

2.1 In a certain city, the local taxes collected in a month amounted to N$1.25 million. If the population of the city is 2×10^4, how much on average did each citizen of the city pay in taxes? (3)

2.2 Solve the following linear equations:

2.2.1 $(x - 2)^2 = (x + 2)^2 - 112$ (3)

2.2.2 $\dfrac{4x}{3} + 1 = 3x$ (3)

2.2.3 $3x - 2 = -5x + 8$ (3)

QUESTION 3(58 marks)

The answers to this question should be written in the answer booklet/sheet provided. Ensure that all your calculations are shown neatly, systematically and legibly.

3.1 NTN has 20% of its employees in the software department, 50% in administration and 12.5% in marketing. The rest of the employees, amounting to 203 employees are in the Research department.

Calculate the:

3.1.1 Total number of employees in NTN (5)

3.1.2 Number of employees in each department (6)

3.2 The airfare for a one-way ticket to Ondangwa from Windhoek – Eros airport varies each day according to demand. The following table shows the how the airfare varies in a particular week:

DAY	Airfare	Price of ticket
Monday	N$1030	N$1030
Tuesday	25% more than Monday price	
Wednesday	10% less than Tuesday price	
Thursday	25% less than Wednesday price	
Friday	20% more than Thursday price	
Saturday	Same as Friday price	

3.2.1 Copy and complete the above table (10)

3.2.2 Determine the day on which the airfare was the most expensive (1)

3.3 Consider the following matrices:

$$A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix} \text{ and } B = \begin{pmatrix} 4 & 3 \\ 1 & -2 \end{pmatrix}$$

Find:

3.3.1 Matrix 3A-B (8)

3.3.2 Determinant of matrix 2A (3)

3.4 Determine the values of the variables in the following:

$$\begin{pmatrix} 2 & b \\ ck & 3 \end{pmatrix} + k \begin{pmatrix} 3 & 1 \\ 0 & -2 \end{pmatrix} = \begin{pmatrix} 8 & 6c \\ -6 & -1 \end{pmatrix}$$

(6)

3.5 Given the following sets:

$S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}$

$A = \{x : x \text{ is a multiple of } 3\}$
$B = \{x : x \text{ is a factor of } 24\}$
$C = \{x : x \text{ is an odd number}\}$

3.5.1 Find

     3.5.1.1 n(B) (2)

     2.5.1.2 (A∪B∪C)^c (2)

3.6 The department of Social welfare at a university carried out a survey on a random sample of students to find out how many of the students took alcohol over the past two weeks. Of the 615 student interviewed, there were 520 male, and 485 of the sampled students took alcohol over the past two weeks. The information is shown in the Venn diagram below:

S=615

Male 520

Alcohol 485
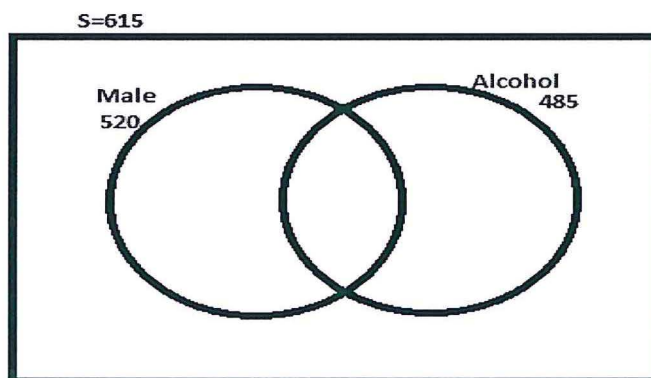
From the Venn diagram above, determine:

3.6.1 The number of male students that too alcohol (3)

3.6.2 The number of male students that did not took alcohol (2)

3.6.3 The number of female students that took alcohol (2)

3.7 Lukas has received his gratuity of N$50 000 and has decided to invest it with the bank for five years in an investment account that pays interest @ 12.75% p.a. He has been given two options:

Option A: Investment at simple interest. (8)

Option B: Investment with interest compounded quarterly.

By showing full calculations, determine which interest option is better for Lukas.

_____**END OF EXAMINATION**_____