namibia University
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH, NATURAL RESOURCES AND APPLIED SCIENCES
SCHOOL OF NATURAL AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

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
DATE: JUNE 2023	**PAPER :** THEORY
DURATION: 3 Hours	**MARKS: 100**

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER:	**DR. J MWANYEKANGE,** MR. F NDINODIVA, MR. J AMUNYELA, MR. S. P KASHIHALWA and MS. P NGHISHIDIVALI
MODERATOR:	MR G. MBOKOMA

INSTRUCTIONS	
	1. Answer ALL the questions in the booklet.
	2. **QUESTION 1** of this question paper entail multiple choice questions with options A to D. Write down the letter corresponding to the best option for each question.
	3. For **QUESTION 2 and 3** show clearly all the steps used in the calculations.
	4. 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(40 marks)

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

1.1   Which of the following numbers is not a natural number?   (1)

   A. 11   **B.** 0   **C.** 1   **D.** 2

1.2   The prime decomposition of 1 155 is: (2)

   A. $3 \times 35 \times 11$ **B.** $3 \times 5 \times 7 \times 11$ **C.** $15 \times 7 \times 11$ **D.** 33×35

1.3   What is the Highest Common Factor (HCF) of 42 and 60?   (2)

   A. 12   **B.** 6   **C.** 4   **D.** 2520

1.4   An atom is 0.00 000 000 025 cm in diameter. Write this figure in standard form.   (2)

   A. 0.25×10^{9} **B.** 0.25×10^{-9} **C.** 25×10^{-11} **D.** 2.5×10^{-10}

1.5   Given that of 440 golf players, 50 drink tea and coffee, 200 drink coffee and 40 drink neither tea nor coffee. How many golf players drink tea only?   (3)

   A. 350   **B.** 250   **C.** 150   **D.** 200

1.6   When a number is doubled and then added to 20, the result is 140. What is the number?   (3)

   A. 50   **B.** 120   **C.** 55   **D.** 60

1.7   The expression, $\sqrt{\left(\dfrac{12}{8} \right)^{-4}}$ simplifies to: (3)

   A. $\dfrac{4}{9}$ **B.** $\dfrac{3}{2}$ **C.** 44   **D.** $\dfrac{44}{4}$

1.8   Determine the value of $36(7 \times 2 - 17) \div 3 + 24 \div 3 + 5$ (3)

   A. 4   **B.** -4 **C.** -1247 **D.** -23

1.9   The expression $-1\dfrac{2}{3} - 2\dfrac{1}{3}$ simplifies to: (3)

   A. $-\dfrac{2}{3}$ **B.** $3\dfrac{1}{3}$ **C.** $-3\dfrac{3}{2}$ **D.** -4

1.10   A man earned N\$450 last month and spent $\dfrac{1}{3}$ of the income on food and $\dfrac{2}{15}$ on transport.

1.10.1 How much did he spend on transport?   (3)

A. N$60   **B.** N$200   **C.** N$95   **D.** N$250

1.10.2 How much did he spend in total?   (3)

      A. N$210   **B.** N$350   **C.** N$220   **D.** N$60

1.11   Evaluate and simplify $\dfrac{0.009999 + 505 \times 0 + 0.990001}{10^{-2}}$ (3)

      A. 100   **B.** 0.001   **C.** 1   **D.** 0.01

1.12   The expression, $\dfrac{x+4}{x^2+4x}$ simplifies to: (3)

      A. $\dfrac{1}{x}$ **B.** $\dfrac{1}{2x}$ **C.** $\dfrac{1}{x^2}$ **D.** $x + 3x^2$

1.13   Simplify the following expressions.

1.13.1 $0.09y + 4xy - 0.72xy - 1.7y - 4ty$ (3)

      A. $-2.31xyt$ **B.** $-1.61y + 3.28xy - 4ty$ **C.** $-1.61y^2 + 3.28x^2y^2 - 4ty$

      D. $4.09xy^2 - 2.42xy^2 - 4ty$

1.13.2 $3(7g - 3) - 5(g - 2g)$ (3)

      A. $6g + 9$ **B.** $6g - 9$ **C.** $26g - 9$ **D.** $-26g - 9$

Question 2 (10 marks) [show all your working]
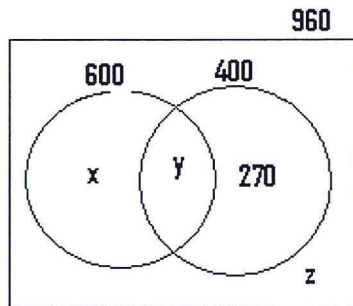
2.1 Factorise the expression, $4p^2q^4 - 4p^2q + 4p^3q$ (4)

2.2   If $x = -2$ then the expression $\dfrac{16x}{-3 - 4x}$ simplifies to: (3)

2.3   Solve the equation, $\dfrac{x}{3} + \dfrac{2x}{4} = x - 6$ (3)

Question 3 (50 marks) [show all your working]

3.1 Calculate the values of x, y *and* z in the Venn diagram below. (6)

$$960$$

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   600      400
  ┌─────────────────────┐
  │                     │
  │   ╭────╮ ╭────╮     │
  │  ╱      X      ╲    │
  │ │   x  │ y │ 270 │  │
  │  ╲      ╱      ╱    │
  │   ╰────╯ ╰────╯     │
  │                 z   │
  └─────────────────────┘
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3.2 Given $A = \{a, b, c, d, e\}$ $\quad B = \{a, d, e, f, h\}$ $\quad C = \{b, c, d, e, f, g\}$

Find:

3.2.1 $A \cap B$ (2)

3.2.2 $(A \cap B) \cup C$ (3)

3.2.3 $p(A \cap B)$ (3)

3.3 All of one hundred and four different pills contain at least one of the vitamins A and B. Forty five contain vitamin A only, $(2x + 9)$ contain vitamin B only, and $3x$ contain both vitamins.

3.3.1 Present the information in a Venn diagram and solve for x. (6)

3.3.2 How many pills contain vitamin B? (1)

3.4 Given vectors $a = \begin{pmatrix} -2 & -3 \end{pmatrix}$ $\quad b = \begin{pmatrix} 1 & \dfrac{5}{3} \end{pmatrix}$

Find $-2a - 3b$ (4)

3.5 Given a matrix, $A = \begin{pmatrix} -2 & -3 \\ 4 & 0 \end{pmatrix}$

Find:

3.5.1 $-2A$ (4)

3.5.2 A^2 (4)

3.5.3 Determinant of A (2)

3.6 After a price increase of 25%, the price of a car is $N\$105\ 000$. What was the price before the increase? (3)

4

3.7 Calculate the amount payable for a loan of N$244 000 after 5 years at the rate of 3.75% p.a. compounded quarterly. (4)

3.8 Find the value of the letters, a, b, c and d in the matrices given below. (8)

$$\begin{pmatrix} -4a & 2b \\ 4c & 6d \end{pmatrix} - \begin{pmatrix} b & 4 \\ a & 12 \end{pmatrix} = \begin{pmatrix} 22 & 48 \\ -12 & 24 \end{pmatrix}$$

--------------------------------END OF EXAMINATION------------------------------