



**NAMIBIA UNIVERSITY  
OF SCIENCE AND TECHNOLOGY**

**FACULTY OF HEALTH, APPLIED SCIENCES AND NATURAL RESOURCES**

**DEPARTMENT OF MATHEMATICS AND STATISTICS**

<b>QUALIFICATION:</b> Bachelor of Technology: Geo-Information Technology, Bachelor of Human Resources Management, Bachelor of Marketing, Bachelor of Transport Management, Bachelor of Business Administration, Bachelor of Agricultural Management, Bachelor of Horticulture	
<b>QUALIFICATION CODE:</b> 07BGIT,07BHRM,07BMAR,07BBAD,27BAGR,07BTRM,07BHOR	<b>NQF LEVEL:</b> 5
<b>COURSE NAME:</b> INTRODUCTION TO MATHEMATICS (BUSINESS AND MANAGEMENT)	<b>COURSE CODE:</b> ITM111S
<b>DATE:</b> NOVEMBER 2022	<b>PAPER :</b> THEORY
<b>DURATION:</b> 3 HOURS	<b>MARKS:</b> 100

**FIRST OPPORTUNITY EXAMINATION QUESTION PAPER**

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**INSTRUCTIONS**

1. Answer ALL the questions in the answer sheet.
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** indicate whether the given mathematical statements are true (T) or false (F).
4. **QUESTION 3** show clearly all the steps used in the calculations.

**PERMISSIBLE MATERIALS**

1. Non-programmable calculator without a cover.

**THIS QUESTION PAPER CONSISTS OF 4 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 The average of two numbers is 7, and three times the difference between them is 18.

What are the numbers? [3]

- A. 52 and 34                      B. 7 and 7                      C. 10 and 4                      D. 8 and 6

1.2 Find the Highest Common Factor (HCF) of the numbers 255,105 and 90. [3]

- A. 45                                      B. 3                                      C. 5                                      D. 15

1.3 The factors of the expression  $-ai + 2x^2 - aix + 2x$  are: [3]

- A.  $(x-1)(2x+ai)$       B.  $(x-1)(2x-ai)$       C.  $(2x-ai)(x+1)$       D.  $ai(2x^2-2x-1)$

1.4 The expression  $\frac{6x^{-4}2x^3}{8x^{-3}}$  simplifies to: [3]

- A.  $\frac{3}{2x^4}$                       B.  $\frac{12x^{-12}}{8x^{-3}}$                       C.  $\frac{3}{2x^2}$                       D.  $\frac{3}{2}x^2$

1.5 Given sets  $\Omega = \{1,2,3,5,7,11,12\}$ ,  $A = \{1,2,3,7,11\}$  and  $B = \{3,5,7,11,12\}$ , find  $(A \cap B)^c$ . [3]

- A.  $(A \cap B)^c = \{1,2,5,12\}$                       B.  $(A \cap B)^c = \{1,2,7,11\}$   
C.  $(A \cap B)^c = \{3,7,11\}$                       D.  $(A \cap B)^c = \{3,5,12\}$

1.6 Expand and simplify the expression  $(x-xy)^2 - x^2 - x(-2xy)$ . [3]

- A.  $-4x^2y^2$                       B.  $x^2y^2$                       C.  $x-xy$                       D.  $-x^2y^2$

1.7 The solutions of the quadratic equation  $4x^2 - 1 = 0$  are: [3]

- A.  $(2x+1)(2x-1)$       B.  $x = \frac{1}{2}$  and  $x = -\frac{1}{2}$                       C.  $x = 0$  and  $x = -1$                       D.  $x = 4$  and  $x = 1$

1.8 Simplify  $(\log_{12} 18 - \log_{12} 3) + \log_{12} 2$ . [3]

A. 1.079

B.  $\log_{12} 6$

C. 1

D.  $\log_{12} 9$

1.9 What is the solution to the following linear equation? :  $\frac{1}{4}(x+5) - \frac{2x}{3} = 0$  [3]

A. 1

B. -1

C. 23

D. 3

1.10 Given  $A = \begin{pmatrix} 1 & 2 \end{pmatrix}$ ,  $B = \begin{pmatrix} -3 \\ 4 \end{pmatrix}$ , and  $C = \begin{pmatrix} -2 & 5 \\ -3 & 6 \end{pmatrix}$ , which one of the following matrix calculations is not possible? [3]

A.  $BC$

B.  $AC$

C.  $CB$

D.  $C^2$

### **QUESTION 2 [10 MARKS]**

Indicate whether each of the given mathematical statements is true (T) or false (F)

2.1  $1.5 \times 10^{-5}$  is the scientific notation of the number 0.0000015. [2]

2.2 A matrix with determinant  $\neq 0$  is invertible. [2]

2.3  $\frac{1}{(-2)^{-4}} = 16$ . [2]

2.4 The value  $x = 7$  does not satisfy the inequality  $x - 7 < 0$ . [2]

2.5 The discriminant is given by the formula  $\Delta = \frac{b^2 - 4ac}{2a}$  [2]

### **QUESTION 3 [60 MARKS] (Clearly show all your work)**

3.1 At a shop, one apple costs eighty cents. Andrew bought three apples and five bananas from this shop for N\$5.65.

3.1.1 How much does one banana cost? [5]

3.1.2 How much would it cost to buy seven apples and eight bananas? [3]

3.2 Use Cramer's rule to solve for  $x$  and  $y$  if  $x + y = 30$  and  $6x + 10y = 220$ . [5]

- 3.3 Out of 180 students, 50 students play Piano (P), 68 play Guitar (G), and 59 play Flute (F). Also 35 play Piano and Guitar, 40 play Guitar and Flute and 25 play Piano and Flute. 15 play all, Piano, Guitar, and Flute.
- 3.3.1 Draw a Venn diagram to represent this information. [4]
- 3.3.2 Find the number of students who:
- 3.3.2.1 Play piano or guitar [2]
- 3.3.2.2 Do not play any of the instruments [2]
- 3.3.2.3 Play flute and piano but not guitar [2]
- 3.4 Find the values of the letters  $x, y$  and  $z$  given that: [6]
- $$\begin{pmatrix} x & 2 \\ y & 3 \end{pmatrix} + \begin{pmatrix} 4 & z \\ x & y+z \end{pmatrix} = \begin{pmatrix} 5 & 5 \\ 3 & 8 \end{pmatrix}$$
- 3.5 Let  $A = \begin{pmatrix} -3 & 5 \\ 0 & -2 \end{pmatrix}$ ,  $B = \begin{pmatrix} -2 & 2 \\ 1 & 0 \end{pmatrix}$  and  $C = \begin{pmatrix} -2 \\ -5 \end{pmatrix}$ . Determine:
- 3.5.1 The matrix  $3A - \frac{1}{2}B$  [4]
- 3.5.2 The product of  $CA$  [2]
- 3.6 The inverse of matrix  $B$  [5]
- 3.7 An investment amount is expected to grow from N\$70000.00 to N\$120000.00 in 4 years when the interest rate is compounded monthly. Calculate the annual interest rate that will give the expected growth. [6]
- 3.8 Find the 30<sup>th</sup> term of the progression 9;13;17;21;... [4]
- 3.9 Find the sum of the first 110 terms of the series  $5 + 12 + 19, \dots$  [5]
- 3.10 Determine the value of the series  $\sum_{i=2}^5 (12 - 2^i)$ . [5]

**END OF EXAMINATION QUESTION PAPER**