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 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	
QUALIFICATION CODE: 07BGIT,07BHRM,07BMAR, 07BBMN, 27BAGA,07BTRM,07BHOR,07BPSM,04CIPM,07BRAR,07BENT	**LEVEL: 5**
COURSE NAME: INTRODUCTION TO MATHEMATICS (BUSINESS AND MANAGEMENT)	**COURSE CODE:** ITM111S
SESSION: JUNE 2023	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Ms A. SAKARIA,** Ms K. DAVID, Ms P. NGHISHIDIVALI, Ms R. KATALE, Mr A. MPUGULU, Mr F. NDINODIVA, Mr B. OBABUEKI
MODERATOR:	Mr T. KAENANDUNGE

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 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

1.2 At present John is twenty years younger than Mary. In five years' time he will be half Mary's age. How old is John now? [3]

A. 35 years B. 55 years C. 15 years D. 20 years

1.3 Simplify $\frac{a^3 b^{\frac{5}{6}}}{a^{\frac{1}{2}} b^{\frac{2}{3}}}$. [3]

A. $a^{\frac{2}{5}} b^{\frac{1}{4}}$ B. $a^{\frac{2}{3}} b^{\frac{5}{6}}$ C. $a^{\frac{1}{2}} b^{\frac{1}{5}}$ D. $a^{\frac{5}{2}} b^{\frac{1}{6}}$

1.4 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

1.5 Determine the value of n that makes the ratio $n:15$ the same as the ratio $36:90$. [3]

A. $n=5$ B. $n=1350$ C. $n=10$ D. $n=6$

1.6 Write the number 0.03249 in standard form to 3 significant figures. [3]

A. 3.24×10^{-1} B. 3.24×10^{-2} C. 3.25×10^{-2} D. 3.25×10^{-3}

1.7 Express the statement "nine more than three times a number" in terms of h. [3]

A. $3h-9$ B. $3(h-9)$ C. $3(h+9)$ D. $3h+9$

1.8 Factorize the expression $2ab^2 - abd - 2bc + cd$ [3]

A. $(2b-d)(ab-c)$ B. $(ab-c)(ab-c)$ C. $(2b-d)(ab+c)$ D. $(2b+d)(ab-c)$

1.9 Which of the following statements is false? [3]

A. $\{a,b,c\} = \{c,a,b\}$ B. $\{\varnothing\} = \varnothing$ C. $\{a,b\} \subset \{a,b,c\}$ D. $A \subset A$

1.10 Determine the sum of the series $\sum_{n=1}^{5}(2n+3)$. [3]

A. 45 B. 90 C. 49 D. 47

QUESTION 2 [10 MARKS]

Indicate whether the given mathematical statements are true (T) or false (F)

2.1 The expression $\ln e\sqrt{x^3}$ simplifies to $x^{\frac{3}{2}}$. [2]

2.2 The expression $16p^4 - 81q^8$ can be factorised fully as $4p^2 - 9q^4$. [2]

2.3 $(\log a)(\log b)$ is equal to $\log(a+b)$. [2]

2.4 The discriminant of the equation $2x^2 - 4x + 9 = 0$ is negative. [2]

2.5 If A is a 2×3 matrix and B is a 3×2 matrix, then we can calculate AB. [2]

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

3.1 Given the system of linear equations: $x - 2y = 0$ and $x - 5 = 3(y-5)$, use Cramer's rule to solve for x and y. [7]

3.2 Solve the inequality $15 \le 7 - \frac{2}{5}x \le 21$ and represent your solution on a number line. [6]

3.3 Simplify the expression $\frac{x^2+3x-10}{x^2-4}$. [5]

3.4 Expand and simplify $(ab-a^2)^2 - (a^4 - 2a^3b)$ [6]

3.5 Let $A = \begin{pmatrix} 6 & -5 \\ -8 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 5 & -7 \\ -11 & 0 \end{pmatrix}$. Find:

3.5.1 AB [4]

3.5.2 Calculate A^{-1} (The inverse of A). [5]

3.5.3 $\frac{1}{2}A$ [4]

3.6 Evaluate $\log_5\left(\frac{1}{\sqrt[3]{5}}\right) + \log_{11}\sqrt[3]{11}$ without using a calculator. [5]

3.7 In a survey of 200 households(HO) regarding the ownership of desktop(D) and laptop (L) computers, the following information was obtained:

120 households(HO) own only desktop(D) computers, 10 households own only laptop(L) computers, and 40 households own neither desktop(D) nor laptop(L) computers.

3.7.1 Present the information in a Venn diagram. [5]

3.7.2 How many households own both desktop and laptop computers? [3]

3.8 The common difference in an Arithmetic Progression (AP) is 3. The 24th term is 74. What is the first term? [4]

3.9 Determine the sum to be invested for 4 years at 8% p.a. compounded semi-annually to amount to $N\$3500$ at the end of the investment period. [6]

END OF EXAMINATION QUESTION PAPER