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

13 Jackson Kaujeua Street
Private Bag 13388
Windhoek
NAMIBIA

T: +264 61 207 2913
E: msas@nust.na
W: www.nust.na

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: INTRODUCTION TO MATHEMATICS (BUSINESS AND MANAGEMENT)	COURSE CODE: ITM111S
DATE: JANUARY 2024	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

SUPPLEMENTARY/ SECOND OPPORTUNITY EXAMINATION QUESTION PAPER

EXAMINER: **Ms A. SAKARIA,** Ms K. DAVID, Ms P. NGHISHIDIVALI, Ms Y. NKALLE

MODERATOR: **Mr I. NDADI**

INSTRUCTIONS

1. Answer ALL the questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. **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.
5. **QUESTION 2** indicate whether the given mathematical statements are true (**T**) or false (**F**).
6. **QUESTION 3** show clearly all the steps used in the calculations.

PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator without a cover.

This 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 Expand and simplify the expression $(x-3)^2-x^2+6x$ [3]

A. $12x+9$ B. $-12x+9$ C. $12x-9$ D. 9

1.2 Evaluate $\log_2 16+\log_3 27+\log 1$. [3]

A. 4 B. 3 C. 7 D. 8

1.3 Simplify $x^2\times\sqrt{y}\times\sqrt[2]{x^4}\times y^{\frac{1}{2}}$. [3]

A. $y\sqrt{x}$ B. $xy^{\frac{1}{2}}$ C. $xy^{\frac{1}{4}}$ D. x^4y

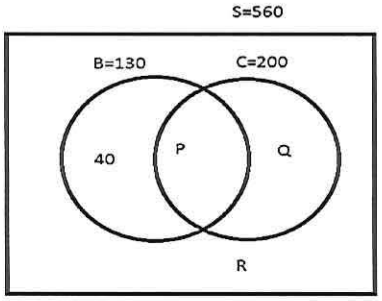
1.4 Find the determinant of the matrix, $\begin{pmatrix}-2 & 3\\ -1 & 2\end{pmatrix}$. [3]

A. -6 B. 1 C. 7 D. -1

1.5 What is the Lowest Common Multiple (LCM) of 30 and 42? [3]

A. 6 B. 210 C. 420 D. 1260

1.6 The values of P, Q and R in the Venn diagram below are: [3]



A. $P=160, Q=200$ and $R=200$ B. $P=130, Q=200$ and $R=320$

C. $P=90, Q=110$ and $R=200$ D. $P=90, Q=110$ and $R=320$

1.7 The prime decomposition of 1287 is: [3]

A. $33\times3\times13$ B. 99×13 C. $3^2\times11\times13$ D. $9\times11\times13$

1.8 Factorize the expression $-2x^3-4x^4+\frac{1}{2}x^2$ [3]

A. $\frac{1}{2}x(-2-x+1)$ B. $\frac{1}{2}x^2(-4x-8x^2+1)$ C. $2x^2\left(\frac{1}{2}x-4x^2+\frac{1}{2}\right)$ D. $\frac{1}{4}x^2(-8x-x^2-1)$

1.9 The equation, $x^2-x-12=0$ has the solutions: [3]

A. $x=4,x=-3$ B. $x=-4,x=-3$ C. $x=-2,x=-6$ D. $x=6,x=-2$

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

A. 48 B. 24 C. 6 D. 12

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 Use Cramer's rule to solve for x and y the following: $2x+y=-1$ and $4x-3y=8$. [7]

3.2 Solve the inequality $-4x>-x-2<2x+1$ and represent your solution on a number line. [6]

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

3.4 Mr. Goagoseb has 48 goats and Mrs Namises has 60 goats. They decide to share 1296 kg of animal feed between them, in the ratio of the numbers of their animals. How many kilograms of animal feed does Mrs. Namises get? [3]

3.5 The value of the letters, a and b in the matrices given below are:

$$2\begin{pmatrix} -a & 4 \\ a & 3 \end{pmatrix} - a\begin{pmatrix} 5 & 2 \\ 4 & -b \end{pmatrix} = \begin{pmatrix} -14 & 4 \\ -4 & 9 \end{pmatrix}$$ [6]

3.6 Given the matrices $X = \begin{pmatrix} 4 & 3 \\ -1 & 1 \end{pmatrix}$ $Y = \begin{pmatrix} 2 & 3 \\ -2 & -1 \end{pmatrix}$ find:

3.6.1 $2X - Y$ [4]

3.6.2 XY [4]

3.7 Given $S = \{a,b,c,d,e,f\}$, $A = \{a,c,d,e\}$, $B = \{a,b,e\}$ find:

3.7.1 $B^c \cup A^c$ [4]

3.7.2 $A \cup B$ [3]

3.8 Of the 60 students(S) in class, 44 can spell the word 'Parallel' (PA), 22 can spell 'Pythagoras' (PY) and 14 can spell neither.

3.8.1 Present this information in a Venn diagram. [4]

3.8.2 How many students can spell both words? [2]

3.8.3 How many students can spell Parallel or Pythagoras? [2]

3.9 Given the progression; $4;12;36;108;...$

3.9.1 Find the seventh term of the progression above. [3]

3.9.2 The sum of the first 5^{th} terms of the progression above. [4]

3.10 Calculate the amount payable for a loan of $N\$2000$ for 3 years at the rate of 10% p.a. compounded semi-annually. [5]

END OF EXAMINATION QUESTION PAPER