NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

QUALIFICATION: DIPLOMA IN BUSINESS PROCESS MANAGEMENT	
QUALIFICATION CODE: 06DBPM	**LEVEL:** 6
COURSE: INTRODUCTION TO MATHEMATICS	**COURSE CODE:** ITM 511C
DATE: NOVEMBER 2019	**SESSION:** 1
DURATION: 3 HOURS	**MARKS:** 100

1st OPPORTUNITY EXAMINATION	
EXAMINER	**MS. L. SAUTI**
MODERATOR	**MR. A. ROUX**

THIS QUESTION PAPER CONSISTS OF 5 PAGES
(INCLUDING THIS FRONT PAGE)

INSTRUCTIONS

1. Answer all the questions and number your solutions correctly.
2. **Question 1** of this question paper entails multiple choice questions with options A to
   D. Write down the letter corresponding to the best option for each question.
   For **Question 2 and 3** you are required to show clearly all the steps used in the calculations.
3. All written work MUST be done in blue or black ink.
4. Untidy/ illegible work will attract no marks.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without the cover.

QUESTION 1 **[30 MARKS]**

1.1 The solution of the quadratic equation $x^2 + 6x = 0$ is ?

A. $x = 0 \; or \; x = -6$
B. $x = 0 \; or \; x = 6$
C. $x = 6 \; or \; x = -6$
D. $x = 0 \; or \; x = -12$ [3]

1.2 Solve the following logarithm: $\log_4 36 + \log_4 (\frac{8}{3})^2$

A. 2
B. 4
C. 6
D. 8 [3]

1.3 The sum of two numbers is 72. One number is twice the other. What are the numbers?

A. $12 \; and \; 24$
B. $24 \; and \; 48$
C. $6 \; and \; 12$
D. $32 \; and \; 64$ [3]

1.4 Given S = {1; 2; 3; 4; 5; 6}, A = {1; 3; 4; 5}, B = {1; 2; 5}. Use this information for 1.4.1, 1.4.2, and 1.4.3.

1.4.1 Find $P(A \cup B)^c$

A. $\{1, 5\}$
B. $\{1, 2, 3, 4, 5, 6\}$
C. $\{6\}$
D. $\{2, 3, 4\}$ [3]

1.4.2 Find $P(A \cap B)$

A. $\{1, 5\}$
B. $\{1, 2, 3, 4, 5, 6\}$
C. $\{6\}$
D. $\{2, 3, 4\}$ [3]

1.4.3 Find $A \oplus B$

A. $\{1, 5\}$
B. $\{1, 2, 3, 4, 5, 6\}$
C. $\{6\}$
D. $\{2, 3, 4\}$ [3]

1.5 Determine the LCM of 126; 216; 243

A. 10206 B. 20412

C. 9 D. 40824 [3]

1.6 If A = $\begin{bmatrix} x & -1 \\ 1 & 2 \end{bmatrix}$ and the det (A) = -3, find the value of x

A. 2 B. -2

C. $\frac{1}{2}$ D. $-\frac{1}{2}$ [3]

1.7 The 4th term of a geometric sequence is 27 and the 6th term is 243.

1.7.1 Find the 1st term.

A. -3 B. 3

C. 1 D. -1 [3]

1.7.2 Find the common ratio.

A. -3 B. 3

C. 1 D. -1 [3]

QUESTION 2 **[40 MARKS]**

2.1 Solve the following inequality and equations:

2.1.1 $2x - y = 3 \quad and$
$3x + 2y = 8$

[8]

2.1.2 $\frac{2}{x+1} > \frac{1}{x} + \frac{2}{5x}$ [4]

2.2 Sarah's dream is to pay cash for a car 6 years from now. She would like to have N$200 000 that time and is considering three investment options. At a nominal interest rate of 7.5% p.a. find how much she should invest now at

2.2.1 a single investment (interest compounded quarterly)
2.2.2 a single investment (interest compounded monthly)
2.2.3 a single investment (interest compounded continuously) [9]

2.3 Consider the following matrices: A = $\begin{bmatrix} 2 & 6 \\ 8 & 2 \end{bmatrix}$ and B = $\begin{bmatrix} -2 & 8 \\ -7 & 2 \end{bmatrix}$

2.3.1 4A – 2B
2.3.2 Find B^2
2.3.3 Find the determinant of A.
2.3.4 Find the inverse of A. [9]

2.4 Given points A = (-4; 18); B = (12; -6); C = (-8; -8) and D = (12; 2)

2.4.1 Find the slope of line AB.
2.4.2 Find the equation of the line parallel to line AB through point C.
2.4.3 Find equation of the line perpendicular to line AB through point D.
2.4.4 Find the length of the line segment CD. (Answer to 2 d.p). [10]

QUESTION 3 **[30 marks]**

3.1 Sarah has a hotdog stand in town. She says her fixed expenses per month are N$2925 per month and the cost for making one burger is N$7.45. Her selling price is N$13.95.

3.1.1 Write formulae for total cost (C) and revenue (R) and profit (P).
3.1.2 How many hamburgers should she sell to make a profit?
3.1.3 What is her profit for sales of 30 burgers per day for 30 days a month? [8]

3.2 In a survey conducted on 2000 security officers at NUST, 48% prefer Coffee (C), 54% like Tea (T), and 64% like Juice (J). Further 28% drink C and T, 32% drink T and J and 30% drink C and J. Only 18% drink all three.

3.2.1 Draw the Venn diagram.
3.2.2 How many drink none of these three?
3.2.3 How many drink T and J but not C?
3.2.4 How many drink C only? [12]

3.3 Kerishney, Kayren and Ansie decided to start saving money (no interest) Kerishney started saving N$200 the first month. Every month later she increases her savings amount by N$95 while Kayren starts saving N$250 the first month and increases her amount by 5%. Ansie starts with 2 cents and every month later doubles this amount.

3.3.1 How much will each of them have after $3\frac{1}{2}$ years?
3.3.2 Who will have the highest amount? [10]

==========END OF EXAMINATION==========