



PAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

QUALIFICATION: DIPLOMA IN BUSINESS PROCESS MANAGEMENT	
QUALIFICATION CODE: 06DBPM	LEVEL: 6
COURSE: INTRODUCTION TO MATHEMATICS	COURSE CODE: ITM 111S
DATE: NOVEMBER 2018	SESSION: 1
DURATION: 3 HOURS	MARKS: 100

1st OPPORTUNITY EXAMINATION	
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**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

[36 MARKS]

1.1 Simplify the following:

1.1.1 $3^{-3} + 27^0 \times 3\left(\frac{1}{3} \text{ of } 9\right)$

A. $\frac{1}{3}$

B. $\frac{1}{27}$

C. 36

D. 0

[3]

1.1.2 $\sqrt{16} + \sqrt[3]{64} - 2^3$

A. 2

B. 4

C. 8

D. 0

[3]

1.2 If $a = -1$ and $b = -3$, find $\sqrt{2a^3 - b^3}$

A. 25

B. 5.39

C. 5

D. 3.32

[3]

1.3 If Ince runs the mile in 4,5 minutes, what is his speed in km/h (to the nearest whole number) if 8 km = 5 miles?

A. 0.12 km/h

B. 40 km/h

C. 8.89 km/h

D. 21.33 km/h

[3]

1.4 Factorise completely the following expressions:

1.4.1 $p^2q + pr - 3pq^2 - 3qr$

A. $(pq - r)(p + 3q)$

B. $(pq + r)(p - 3q)$

C. $(pq - 3q)(p + r)$

D. $(pq + p)(r - 3q)$

[3]

1.4.2 $3x^2 - 7x + 2$

- A. $(3x - 1)(x + 2)$ B. $(3x + 1)(x + 2)$
C. $(3x - 6)(x - 1)$ D. $(3x - 1)(x - 2)$ [3]

1.4.3 $2x^3 - 8xy^2$

- A. $2x(x^2 - 4y^2)$ B. $2x(x - 2y)(x - 2y)$
C. $x^2 - 4y^2$ D. $2x(x - 2y)(x + 2y)$ [3]

1.5 Determine the values of the letters in the following matrix equation:

$$\begin{bmatrix} 4 & m \\ n & 14 \end{bmatrix} + \begin{bmatrix} 8 & n \\ -6 & 4 \end{bmatrix} = \begin{bmatrix} m & 18 \\ p & 18 \end{bmatrix}$$

1.5.1 the value of m

- A. 12 B. 0
C. 6 D. 18 [3]

1.5.2 the value of p

- A. 0 B. 12
C. 6 D. 4 [3]

1.6 For a certain arithmetic progression, the first term is -3 and the common difference is 5. Determine the 24th term.

- A. 112 B. 118
C. 100 D. 1308 [3]

1.7 Chamell invests N\$250 at an annual interest rate of 12% compounded continuously. At the end of 5 years, how much was:

1.7.1 the value of this investment?

- A. N\$281.87 B. N\$400.00
C. N\$440.59 D. N\$455.53 [3]

1.7.2 the interest she received after five years?

- A. N\$31.87 B. N\$150.00
C. N\$190.59 D. N\$205.53 [3]

QUESTION 2

[34 MARKS]

2.1 Determine the following: $\log_5 125 + \log_4 256 - \log_7 7^7$ [5]

2.2 Victoria uses 4 parts flour, 3 parts sugar and 1 part milk to bake wedding cakes. A typical cake weighs 1,24 kg and she has to bake 35 cakes this month. She buys the sugar in 2kg packets (at N\$30) and the flour in 5kg bags (at N\$60).

2.2.1 How many packets of sugar should she buy?

2.2.2 How many bags of flour are needed?

2.2.3 What is the total cost of sugar and flour for these cakes (including VAT)? [9]

2.3 Consider the following matrices: $A = \begin{bmatrix} 4 & 12 \\ 6 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -4 & 6 \\ -9 & 4 \end{bmatrix}$

2.3.1 $2A - 3B$

2.3.2 Find B^2

2.3.3 Find the determinant of A.

2.3.4 Find the inverse of A. [10]

2.4 Given points A(-2;9); B(6; -3); C(-4;-4) and D(6;1)

2.4.1 Find the slope of line AB.

2.4.2 Find where line AB cuts the y-axis.

2.4.3 Find the equation of the line parallel to line AB through point D.

2.4.4 Find the equation of line CD.

2.4.5 Find the length of the line segment CD. [10]

QUESTION 3

[30 marks]

3.1 Sofia says her fixed expenses per month are N\$3 510.00 per month and the cost for making one burger is N\$8.50. Her selling price is N\$15.00.

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 There are three good reasons given by students who perform well in Mathematics: they attend classes (C); they solve many tutorial problems given by lecturer; (P) and they do group work (G). Below are the responses given by the top 60 performers in Introduction to Mathematics classes of 2018 at NUST: 30 attended classes regularly; 30 solved the tutorial problems and 20 did group work. Twelve said they did group work and attended classes; 10 solved problems and did group work; 18 solved tutorial problems and went to class while seven said it was because of all the three reasons.

3.2.1 Draw the Venn diagram.

3.2.2 How many performed well not because of all the three reasons?

3.2.3 How many performed well by solving tutorial problems only?

3.2.4 How many performed well by not doing group work?

3.2.5 How many performed well by attending classes or solving tutorial problems? [12]

3.3 Sofia saves N\$200 the 1st month and every month later N\$50 more.

Dalyn also starts saving N\$200 the 1st month but increases this amount by 5% each month. Victoria starts saving 50 cents the first month and decides to double the amount every month. Who will save the biggest amount after two and half years? [10]

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