



**NAMIBIA UNIVERSITY**  
**OF SCIENCE AND TECHNOLOGY**  
Faculty of Health, Applied Sciences & Natural Resources  
Department of Mathematics and Statistics

<b>QUALIFICATION :</b> Bachelor of Technology : Accounting and Finance, Advanced Diploma in the Theory of Accounting, Bachelor of Accounting and Diploma in Accounting and Finance	
<b>QUALIFICATION CODE:</b> 23BACF ;07BACP; 06BDAF; 07ADTA	<b>LEVEL:</b> 5
<b>COURSE:</b> QUANTITATIVE METHODS	<b>COURSE CODE:</b> QTM511S
<b>SESSION:</b> June 2022	<b>PAPER:</b> THEORY
<b>DURATION:</b> 3 Hours	<b>MARKS:</b> 100

<b>FIRST OPPORTUNITY EXAMINATION QUESTION PAPER</b>	
<b>EXAMINER(S)</b>	<b>Mrs. H.Y. Nkalle; Mrs. A. Sakaria; Dr. J. Ongala; Dr. D. Ntirampeba; Prof. A.S. Eegunjobi</b>
<b>MODERATOR:</b>	<b>Dr. D.B. Gemechu</b>

<b>INSTRUCTIONS</b>
<ol style="list-style-type: none"><li>1. Answer ALL the questions.</li><li>2. Write clearly and neatly.</li><li>3. Number the answers clearly.</li></ol>

**PERMISSIBLE MATERIALS**

1. Non-Programmable Calculator without the cover

**ATTACHMENTS**

2. Formula Sheet

**THIS QUESTION PAPER CONSISTS OF 5 PAGES (Including this front page)**

**Question 1**

If Yvonne lends N\$4500 to Golda at 10% p.a. and Golda lends the same sum to Tida at 11.5% p.a., then the gain of Golda in a period of 4 years is? [5]

**Question 2**

Mr. Nkalle invested an amount of N\$20,900 divided in two different schemes A and B at the simple interest rate of 9% p.a. and 8% p.a, respectively. If the total amount of simple interest earned in 2 years is N\$3508, what was the amount invested in Scheme B? [8]

**Question 3**

If you start a bank account with N\$15,000 and your bank compounds the interest monthly at an interest rate of 9% p.a, how much money do you have at the year's end?  
(Assume that you do not add or withdraw any money to/from the account). [5]

**Question 4**

Milly took a loan of N\$900 with simple interest for as many years as the rate of interest. If she paid N\$324 as interest at the end of the loan period, what was the rate of interest? [5]

**Question 5**

N\$1000 is placed in an account at 4% compounded annually for 2 years. It is then withdrawn at the end of the two years and placed in another bank at the rate of 5% compounded semi annually for 4 years. What is the balance in the second account after the 4 years? [7]

**Question 6**

If Jacob takes out a discounted loan with a face value of N\$ 5000 for 6 months from a lender who charges a 9.5% discount rate, what is the discount, and how much money does Jacob receive? [6]

**Question 7**

A machine costing N\$200 000 has effective life of 7 years and its scrap value is N\$30000. What amount should the company deposit annually into a sinking fund earning 5% per annum so that it can replace the machine after its useful life? Assume that a new machine will cost N\$300 000 after 7 years. [7]

**Question 8**

Find the effective interest rate equivalent to a nominal rate of 10% compounded monthly. [5]

**Question 9**

9.1 Nam Water recently surveyed a sample of employees to determine how far they lived from their corporate headquarters. The results are shown below.

Distance (in Km)	Number of days
0 up to 5	4
5 up to 10	15
10 up to 15	27
15 up to 20	18
20 up to 25	6

9.1.1 Compute and interpret the modal distance. [6]

9.1.2 Find the minimum distance associated with the 25% of employees living further away from Nam Water headquarter. [5]

9.1.3 Compute the interquartile range. [7]

**Question 10**

A used cars spare parts company that specialises in imported cars has recorded its ordered and cost of screens for its three different screens. The screens are classified as Front, side, and rear.

	2015		2017	
	Unit price (N\$)	Quantity ordered	Unity price	Quantity ordered
Front	4500	24	6500	36
Side	2450	37	4600	44
Rear	6500	12	7850	14

10.1. Construct a quantity index to reflect the overall change in quantities of screens ordered for the period 2015 – 2017. Use the Paasche approach. Interpret your index. [5]

10.2. Calculate the unweighted aggregate price index for 2017 on 2015 as base year. Interpret your index. [4]

**Question 11**

The quarterly visitors of a large tourist site have been recorded for four years. These data are listed here

Year	Quarter	Visitors (in 1000)
1999	Winter	117
	Spring	80.7
	Summer	129.6
	Fall	76.1
2000	Winter	118.6
	Spring	82.5
	Summer	121.4
	Fall	77.0
2001	Winter	114
	Spring	84.3
	Summer	119.9
	Fall	75.0
2002	Winter	120.7
	Spring	79.6
	Summer	130.7
	Fall	69.6

Compute the 4-period centered moving average for the quarterly visitors.

[4]

**Question 12**

Solve the following inequality

$$\frac{3}{4x+3} \leq \frac{2}{3} \leq \frac{2}{x+5} .$$

[8]

**Question 13**

13.1. Researchers at Namibia University of Science and Technology (NUST) have determined that children under 2 years old who sleep with the light on have a 36 % chance of becoming myopic before they are 16. Children who sleep in darkness have a 21 % chance of becoming myopic. A survey indicated that 28% of children under 2 sleeps with some light on. Find the probability that child under 16 is myopic.

[4]

13.2. What is the term used to describe two events whose union is the same as the sample space? [2]

**Question 14**

Define the following terminologies as applied in index numbers

14.1 Laspeyres Index [2]

14.2 Index Number [3]

14.3 Simple Index Number [2]

**End of exam paper**

**Total marks: 100**

## Formula(s) sheet

$$I = prt$$

$$A = P(1 + rt)$$

$$t = \frac{N-1}{r} \text{ for } N \geq 2$$

$$D = Adt$$

$$P = A(1 - dt)$$

$$D = A - P$$

$$r_{eff} = \left(1 + \frac{r}{m}\right)^m - 1$$

$$A = P\left(1 + \frac{r}{m}\right)^{mt}$$

$$r = \frac{d}{1-dt}$$

$$r_{eff} = \frac{r}{1-rt}$$

$$d = \frac{r}{1+rt}$$

$$t = \frac{\log A - \log P}{m \log \left(1 + \frac{r}{m}\right)}$$

$$t = \frac{\log 2}{m \log(1 + \frac{r}{m})}$$

$$s_n = R \left[ \frac{(1+i)^n - 1}{i} \right]$$

$$A_n = R \left[ \frac{1 - (1+i)^{-n}}{i} \right]$$

$$paasche = \left[ \frac{\sum_{i=1}^n (p_1 \times q_1)}{\sum_{i=1}^n (p_0 \times q_1)} \right] \times 100$$

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$$Laspeyers = \left[ \frac{\sum_{i=1}^n (p_1 \times q_0)}{\sum_{i=1}^n (p_0 \times q_0)} \right] \times 100$$

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$$s_x^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n - 1} = \frac{\sum_{i=1}^n x_i^2 - n\bar{x}^2}{n - 1}$$

$$s_x^2 = \frac{\sum_{i=1}^n f_i (x_i - \bar{x})^2}{n - 1} = \frac{\sum_{i=1}^n f_i x_i^2 - n\bar{x}^2}{n - 1}$$

$$M_k = I + \frac{h}{f} \left( \frac{kn}{4} - F \right)$$

$$\begin{aligned} M_o &= l_{M_o} + \frac{f_1 - f_0}{2f_1 - f_0 - f_2} \times h \\ &= I_{M_o} + \frac{f_1 - f_0}{(f_1 - f_0) + (f_1 - f_2)} \end{aligned}$$

$$M_d = I_{M_d} + \frac{h}{f} \left( \frac{n}{2} - F \right)$$

$$\bar{x} = \frac{\sum_{i=1}^n f_i x_i}{\sum_{i=1}^k f_i}$$

$$P(B \setminus A) = \frac{P(A \cap B)}{P(A)}$$

$$b = \frac{n \sum xy - \sum x \sum y}{n \sum x^2 - (\sum x)^2}$$

$$a = \frac{\sum y - b \sum x}{n}$$

$$b = \frac{\sum xy}{\sum x^2}$$



$$a = \frac{\sum y}{n}$$

$$\bar{x} = \frac{\sum x_i}{n}$$

$$s_x = \sqrt{s_x^2}$$

$$CV = \frac{s_x}{\bar{x}} \times 100$$