



**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 : Accounting and Finance, Advanced Diploma in the Theory of Accounting, Bachelor of Accounting and Diploma in Accounting and Finance	
QUALIFICATION CODE: 23BACF;07BACP; 06BDAF; 07ADTA	LEVEL: 5
COURSE CODE: QTM511S	COURSE NAME: QUANTITATIVE METHODS
SESSION: JULY 2023	PAPER: THEORY
DURATION: 3 HOURS	MARKS: 100

SUPPLEMENTARY/SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Mrs. H.Y. Nkalle; Mrs. A. Sakaria; Dr. D. Ntirampeba; Mr. A. Mpugulu
MODERATOR:	Dr. D.B.GEMECHU

<p style="text-align: center;">INSTRUCTIONS</p> <ol style="list-style-type: none">1. Answer ALL the questions.2. Write clearly and neatly.3. Number the answers clearly.

PERMISSIBLE MATERIALS

1. Non-Programmable Calculator without the cover

ATTACHMENTS

2. Formula Sheet

THIS QUESTION PAPER CONSISTS OF 8 PAGES (Including this front page and formula sheet)

Question 1 [2, 2, 3, 3, 2, 2 Marks]

Two thousand randomly selected adults were asked whether they have ever shopped on the internet. The following table gives a two-way classification of the responses

	Have Shopped(H)	Have never Shopped(N)
Male(M)	200	600
Female(F)	350	350

If one adult is selected at random from these 2000 adults, find the probability that this adult

9.1 Has never shopped on the internet

9.2 Is a male

9.3 Has shopped on the Internet given that this adult is a female

9.4 Is a male or has never shopped on the Internet?

9.5 Is a male or female

9.6 Are the events "female" and "have shopped" independent? Explain?

Question 2 [10, 2 Marks]

The table below shows the Database of ipod(s) sales and newspaper advertisements placed.

Advertisements (x)	Sales (y)
4	26
4	28
3	24
2	18
5	35
2	24
4	36
3	25
5	31
5	37
3	30
4	32

2.1 Find the straight-line regression equation to estimate the number of ipods that are expected to be sold based on the number of advertisement placed.

2.2 Predict the value of sales when number of advertisement is 6.

Question 3 [10 marks]

Given the prices (in N\$) and per capita consumption (in N\$) for apples, bananas, and oranges, Determine the weighted price index using the Laspeyres method. Use 2010 as the base year. [10]

Year	Apple		Banana		Oranges	
	P	Q	P	Q	P	Q
2010	0.692	19.2	0.342	20.2	0.365	14.3
2014	0.896	18.8	0.491	31.4	0.843	8.6

Question 4 [11 marks]

Let $A = \begin{bmatrix} -1 & 1 & -1 \\ 3 & -1 & -1 \\ 2 & 1 & -3 \end{bmatrix}$. Solve the following homogeneous system of linear equations $AX = 0$. Is the solution unique? Explain.

Question 5 [10 Marks]

Lama Abel borrowed N\$20 000 at 5% for three and half years. She wants to pay N\$8000 on maturity. To achieve this, she is planning to pay 2000 in 10 months, 5000 in 16 months from now. How much should she pay in two and half years from now to meet her obligation?

Question 6 [8 Marks]

Emma Ipinge want to be able to withdraw N\$8500 at the end of five years and withdraw N\$3500 at the end of seven years leaving a zero balance in the account after the last withdrawal. If she can earn a simple interest of 6% p.a. on her balances, how much must she deposit in two years from now to satisfy her withdrawal needs?

Question 7 [5 Marks]

A compound amount of N\$ 2350 is due in 5 years. Determine the equivalent value of the debt in 2 years from now, if money is worth 10% p.a. compounded twice a year.

Question 8 [5 Marks]

Determine the time required to double the principal amount of \$10, 000 invested in an account paying interest at 5% compounded semi-annually.

Question 9 [11, 3 Marks]

A sum of N\$100 has been deposited at the end of each month for the past 20 years into a special fund. In the initial 10 years the fund is paying interest at 6% p.a compounded monthly. And in the last 10 years the fund is paying 12% interest p.a compounded monthly. Calculate the:

9.1 Total accumulated value of this annuity at the end of its 20-year term.

9.2 Compound interest earned by the annuity.

Question 10 [4 Marks]

Find the effective interest rate equivalent to a nominal rate of 15% compounded monthly.

Question 11 [2, 3, 2]

Define the following terminologies as applied in index numbers

11.1 Laspeyres Index

11.2 Index Number

11.3 Simple Index Number

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

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

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

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

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

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

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

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

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

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

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

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

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

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