NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

Faculty of Health and Applied Sciences

Department of Mathematics and Statistics

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: QUANTITATIVE METHODS	**COURSE CODE:** QTM511S
SESSION: July 2019	**PAPER:** THEORY
DURATION: 3 Hours	**MARKS:** 100

SUPPLEMENTARY / SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Mr. A Roux**; Ms. S Mwewa; Dr. G Dibaba; Mr. D Ntirampeba
MODERATOR:	**Mr. J Swartz**

INSTRUCTIONS
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 4 PAGES INCLUDING THIS FRONT PAGE (Excluding **the formula sheet**)

QUESTION 1 [34]

1.1) A company's sales for the years 2001 to 2009 were as follows: (x N$ 10 000)

Year	2009	2010	2011	2012	2013	2014	2015	2016	2017
Sales	324	296	310	305	295	347	348	364	370

1.1.1) Plot the time series data (4)

1.1.2) Derive, by using the method of least squares, an equation of linear trend for the sales of the company. (Use sequential numbering with x = 1 in 2009) (8)

1.1.3) Compute trend values for the years 2007 and 2020 (6)

1.2) Below are prices of toothpaste, shampoo, cough tablets, and antiperspirant for August 2000 and August 2003. Also included are quantities purchased.

	August 2000		August2003	
Item	Price	Quantity	Price	Quantity
Toothpaste	2.49	6	2.69	6
Shampoo	3.29	4	3.59	5
Cough tablets	1.59	2	1.79	3
Antiperspirant	1.79	3	2.29	4

Use 2000 as the base period to compute and interpret the price relatives for 2003 for

1.2.1 toothpaste (3)

1.2.2 shampoo (3)

1.2.3 Construct a price index to reflect the overall change in prices of the items purchased for the period 2000 – 2003. Use the Laspeyres approach. Interpret your price index. (5)

1.2.4) Calculate and interpret the unweighted aggregate price index for 2003 on 2000 as base year. (5)

QUESTION 2 [8]

You win the lottery and get $100,000. You decide that you want to invest all of the money in a savings account. However, your bank has two different plans. In 5 years from now, which plan will provide you with more money? Plan 1 The bank gives you a 6% interest rate and compounds the interest each month. Plan 2 The bank gives you a 6% interest rate and compounds the interest every 2 months. (8)

QUESTION 3 [20]

3.1) A sample of 30 delivery times taken by a courier service to deliver parcels from Ongha to Eenhana is shown in the frequency table Below

Time(minutes)	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30
Frequency	3	5	9	7	6

Use the data set to calculate and interpret the

3.1.1) Mean (4)
3.1.2) Standard deviation (6)

3.2 During one month, time records show the following results for the number of production workers absent per day :

13	14	9	17	21	10	15	22	19	13
22	13	19	23	17	21	10	9	20	18

For the distribution above, calculate and interpret:

3.2.1) variance (5)
3.2.2) standard deviation (2)
3.2.3) coefficient of variation (3)

QUESTION 4 [14]

Consider the contingency table below.

	Production	Sales	Management	Others	**Total**
Undergraduate	92	76	24	65	**257**
Graduate	19	15	62	41	**137**
Postgraduate	15	26	37	28	**106**
Total	**126**	**117**	**123**	**134**	**500**

If one employee is randomly selected, what is the probability that he or she:

4.1) is either a postgraduate or belongs to sales department? (3)

4.2) is an undergraduate given that he belongs to production department? (3)

4.3) is neither a postgraduate nor belongs to management department? (4)

4.4) does not belong to sales department given that he is not a graduate? (4)

QUESTION 5 [24]

5.1) Ketu want to be able to withdraw N$7000 at the end of five years and withdraw N$4000 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? (6)

5.2) A company considered that a major capital expenditure of $100,000 is anticipated in 10 years. What amount does the owner need to deposit annually in the next 10 years in order to accumulate the capital that will be needed to fund such expenditure if the annual interest rate that can be earned is 5%? (6)

5.3) An amount was invested on Jan 1, 2015 such that it generated a periodic payment of N$2000 at the end of each month of the calendar year 2015. The annually interest rate on the investment was 13.2%. What was the original investment? (6)

5.4) Solve and graph the following inequality (6)

$$2(x+5) - 60 \leq 5(x-4) \leq 15 + 2(x+5)$$

XXXXXXXXXXX END OF EXAMINATION XXXXXXXXXXXXX

SUMMARY OF FORMULAE QTM511S

JUNE/July 2018 EXAM

Simple Interest: $I = Prt$

Compound Interest: $A = P(1+i)^n$

Effective Interest Rate $r_{eff} = \dfrac{r}{1-rt}$

Effective Interest Rate $r_{eff} = \left(1+\dfrac{r}{m}\right)^m - 1$

Discount $P = A(1-dt)$ $D = Adt$

Simple discount Rate $d = \dfrac{r}{1 + rt}$

Nominal Interest Rate $r = m\left[\left(1+r_{eff}\right)^{\frac{1}{m}} - 1\right]$

Ordinary Annuity Certain **Ordinary Annuity Certain**

$$S_n = R\left[\frac{\left(1+\frac{r}{m}\right)^n - 1}{\frac{r}{m}}\right] \qquad A_n = R\left[\frac{1-\left(1+\frac{r}{m}\right)^{-n}}{\frac{r}{m}}\right]$$

Period $t = \dfrac{\log S - \log P}{m\log\left(1+\dfrac{r}{m}\right)}$ $n = \dfrac{\log 2}{\log\left(1+\dfrac{r}{m}\right)}$

$t = \dfrac{N-1}{r}$ *for* $N \geq 2$ $n = \dfrac{\log(\frac{iS_n}{R}+1)}{\log(1+i)}$ $n = -\dfrac{\log(1-\frac{iA_n}{R})}{\log(1+i)}$

Measures of Central Tendency

Mean $\bar{x} = \frac{\sum x}{n}$ $\bar{x} = \frac{\sum fx}{\sum f}$

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

Mode $M_0 = l_{Mo} + h\left[\frac{f_1 - f_o}{(f_1 - f_o) + (f_1 - f_2)}\right]$,

Measures of dispersion

$Variance = \frac{\sum fx^2 - n(\bar{x})^2}{n-1}$ or $Variance = \frac{\sum\left(x - \bar{x}\right)^2}{n-1}$ coefficient of variation $= \left(\frac{S}{\bar{x}}\right) \times 100$

Standard deviation$=\sqrt{\text{variance}}$ $M_k = l + \frac{h}{f}\left(\frac{kn}{4} - F\right)$

Quartile

Index Numbers

$Laspeyres\ price\ index = \frac{\sum(P_i \times Q_b)}{\sum(P_b \times Q_b)} \times 100\%$ $Paasche\ price\ index = \frac{\sum(P_i \times Q_i)}{\sum(P_b \times Q_i)} \times 100\%$

$Laspeyres$ quantity $index = \frac{\sum(P_b \times Q_i)}{\sum(P_b \times Q_b)} \times 100\%$ $Paasche$ quantity $index = \frac{\sum(P_i \times Q_i)}{\sum(P_i \times Q_b)} \times 100\%$

Time Series

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

Probability

$P(A \cup B) = P(A) + P(B) - P(A \cap B)$ $P(A \cap B) = P(A)P(B)$

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