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: June 2019	**PAPER:** THEORY
DURATION: 3 Hours	**MARKS:** 100

FIRST OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER(S)	**Mr. A Roux**; Ms. S Mwewa; Dr. G Dibaba; Dr. 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 [32]

1.1) The following table shows the number of pedestrians involved in serious road accidents in Windhoek during the years 2008 – 2018.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	
Nr.Pedestrians	33	30	35	31	34	30	33	35	33	36	39	

1.1.1) Plot the time series data. (7)

1.1.2) Determine the least squares trend line equation, using the sequential coding method to code the time variable. Start your coding for the first period (2008) as 1. (10)

1.1.3) Estimate the number of pedestrians involved in serious road accidents in Windhoek 2021 (3)

1.2) Given the following prices and quantities:

	Price (per kg)			Quantities produced		
	2008	2013	2018	2008	2013	2018
Milk	3.95	3.89	4.13	675	717	436
Cheese	61.50	62.20	59.70	117	115	115
Butter	34.80	35.40	38.90	77	74	82

1.2.1) Compute and interpret the Laspeyres price index number for the year 2018 with 2008 as base. (6)

1.2.2) Compute and interpret the Paasche's price index number for the year 2018 with 2008 as base. (6)

QUESTION 2 [11]

2.1) 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)]

2.2) Patrick recently purchased a car for N$45000 and decided to finance the car by obtaining a car loan from FNB, payable at the end of each month for 4 years at an annual interest rate of 12.90%. Determine Patrick's monthly payments on the loan.(5)

QUESTION 3 [20]

During one month, time records shows 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 the:

3.1) Range (2)
3.2) Mode (1)
3.3) Median (4)
3.4) Arithmetic mean (3)
3.5) Variance (5)
3.6) Standard deviation (2)
3.7) Coefficient of variation (3)

QUESTION 4 [15]

The Office of The Bursar at The Namibia University of Science and Technology (NUST) revealed some information regarding method of payment for a group of 2000 students at different levels of study.

	Bursary	**Loan**	**Self**	**Totals**
Certificate	12	379	727	**1118**
Diploma	39	106	642	**787**
Degree	48	20	57	**95**
Totals	**69**	**505**	**1426**	**2000**

4.1) Find the probability of randomly selecting one student from this group who pays for him/herself? (2)

4.2) Find the probability of randomly selecting one student from this group who has a Diploma or a Degree? (4)

4.3) Find the probability of randomly selecting one student from this group who has a Bursary or Degree? (4)

4.4) What is the chance of randomly selecting one student with a degree, given that this student has a loan? (5)

QUESTION 5 [22]

5.1) A person plans to deposit one sixth of a monthly salary of N$7200 at the end of every month for three years into an account paying interest at the rate of 4% compounded monthly. Determine how much will be in the account at the end of the three years. (4)

5.2) Jonas takes out a loan of N$ 100 000 at 9% p.a. simple interest to finance his study at NUST for 7 years. He won a prize and decided to repay N$ 20 000 after 3 years, N$ 45 000 after a further two years and a further N$ 16 000 after a further year. What is the amount outstanding of seven years after the loan was taken out? (6)

5.3) Solve the following system of linear equations. Is the solution unique? Explain. (8)

$$2x + 2y - 2z = -4$$
$$-2x + y - z = -5$$
$$x - 2y - 2z = -1$$

5.4) Solve and represent on the number line the following inequality. (4)

$$4(3x+20) \leq 50$$

XXXXXXXXXXXXX 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 $d = \dfrac{r}{1 + r\,t}$

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

Ordinary Annuity Certain

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

Ordinary Annuity Certain

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

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 $\bar{x} = \dfrac{\sum x}{n}$ $\bar{x} = \dfrac{\sum fx}{\sum f}$

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

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

Measures of dispersion

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

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

Quartile

Index Numbers

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

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

Time Series

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

Probability

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

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