NAMIBIA UNIVERSITY
OF SCIENCE AND TECHNOLOGY

FACULTY OF HEALTH AND APPLIED SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

QUALIFICATION: Bachelor of science in Applied Mathematics and Statistics	
QUALIFICATION CODE: 07BAMS	**LEVEL:** 6
COURSE CODE: DEM620S	**COURSE NAME:** DEMOGRAPHY
SESSION: JANUARY 2019	**PAPER:** THEORY
DURATION: 3 HOURS	**MARKS: 90**

SECOND OPPORTUNITY EXAMINATION QUESTION PAPER	
EXAMINER	Mr. A.J. ROUX
MODERATOR:	Mr J.J. Swartz

INSTRUCTIONS
1. Answer ALL the questions in the booklet provided. 2. Show clearly all the steps used in the calculations. 3. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS

1. Non-programmable calculator without a cover.

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

QUESTION 1 [21]

1.1) Distinguish between

1.1.1) Population characteristics and population processes (4)
1.1.2) Absolute and the relative size of a population (2)
1.1.3) General fertility and total fertility rate (4)
1.1.4) Longevity and lifespan (2)

1.2) State the balancing formula which is used to express population growth. (identify all variables in the formula) (5)

1.3) Name and briefly describe two components to consider in determining "the ability to resist death" (4)

QUESTION 2 [21]

2.1 Describe the Age Structure of a population in terms of :

2.1.1) Age categories (3)
2.1.2) Median Age (3)
2.1.3) Age dependency ratio (3)

2.2 The **Table 1** : figures obtained from 2001 Population and Housing Census of Namibia (Source : CBS, 2001 Population and Housing Census National Report)

Age Group	Population			
	Total	Female	Male	Not Stated
- 4	241 230	121 185	120044	1
5 - 9	246 965	125 179	121 785	1
10 - 14	230 288	117 206	113 081	1
15 - 19	202 298	102 991	99 307	
20 - 24	174 484	88 102	86 382	
25 - 29	150 786	76 479	74 304	3
30 - 34	118 532	61 404	57 125	3
35 - 39	96 417	51 333	45 083	1
40 - 44	74 051	39 880	34 170	1
45 - 49	57 752	30 807	26 942	3
50 - 54	47 779	25 780	21 999	
55 - 59	35 209	18 609	16 600	
60 - 64	34 378	18 809	15 569	
65 - 69	25 264	13 863	11 399	2
70 - 74	22 052	12 739	9 313	
75 - 79	16 009	9 625	6 382	2
80 - 84	13 818	8 459	5 359	
85 - 89	5 407	3 374	2 033	
90 - 94	2 555	1 628	927	
95 +	2 712	1 815	897	
Not stated	32 344	13 305	19 020	19
Total	1 830 330	942 572	887 721	37

Use the data set provided above to calculate and interpret the following

2.2.1) The age dependency ratio for the total Namibian population (3)

2.2.2) The gender ratio for the age category " 50 – 54 " years (3)

2.2.3) The median age for the **female** population (6)

QUESTION 3 [18]

3.1) Briefly define a life table, and discuss the importance of a life table (2)

3.2) Name and briefly describe the two most commonly used life tables. (2+2 = 4)

3.3) Consult the Abridged Life Table provided below, and give the following answers (6 x 2 =12)

TABLE 2 : Abridged Life Table

Period of life between exact ages x and $x+n$	Proportion of persons alive at beginning of age interval dying during interval $_nq_x$	Of 100,000 born alive: Number alive at beginning of age interval l_x	Of 100,000 born alive: Number who die during age interval $_nd_x$	Stationary population: In the age interval $_nL_x$	Stationary population: In this and all subsequent age intervals T_x	Life expectancy[a] e_x^o
0–1	0.00659	100,000	659	99,435	7,907,507	79.1
1–5	0.00135	99,341	134	397,043	7,808,072	78.6
5–10	0.00083	99,207	82	495,812	7,411,029	74.7
10–15	a	99,125	92	495,426	6,915,217	69.8
15–20	0.00220	99,033	218	494,654	6,419,791	64.8
20–25	0.00242	98,815	239	493,488	5,925,137	60.0
25–30	0.00311	98,576	307	492,128	5,431,649	55.1
30–35	0.00430	b	423	490,336	4,939,521	50.3
35–40	0.00608	97,846	595	487,848	4,449,185	f
40–45	0.00858	97,251	834	484,325	3,961,337	40.7
45–50	0.01269	96,417	1,224	479,247	3,477,012	36.1
50–55	0.02036	95,193	c	471,421	2,997,765	31.5
55–60	0.03150	93,255	2,938	459,363	e	27.1
60–65	0.05068	90,317	4,577	440,808	2,066,981	22.9
65–70	0.07484	85,740	6,417	413,497	1,626,173	19.0
70–75	0.11607	79,323	9,207	d	1,212,676	15.3
75–80	0.17495	70,116	12,267	321,360	837,896	12.0
80–84	0.27721	57,849	16,036	250,275	516,536	8.9
85+	1.00000	41,813	41,813	266,261	266,261	6.4

[a]Average number of years of life remaining at the beginning of the age interval.

Source: National Center for Health Statistics, National Vital Statistics Reports, *United States Abridged Life Tables, 1996*, Vol. 47, No. 13, Hyattsville, Maryland, 1998.

a) The proportion of persons alive at beginning of age interval dying during interval. $_nq_x$

b) The number alive (out of 100 000 born alive) at beginning of age interval, l_x

c) Number who die (out of 100 000 born alive) during age interval, $_nd_x$

d) Stationary population in the age interval, $_nL_x$

e) Stationary population in this and all subsequent age intervals, T_x

f) The life expectancy. e_x^0

QUESTION 4 [30]

4.1) Carefully distinguish between the following:

4.1.1) Crude birth rate **and** general fertility rate (4)
4.1.2) Gross reproduction rate **and** net reproduction rate (4)

4.2) The **Table 3**: Number of births to women of Namibia in urban and rural areas in the 12 months before the census, obtained from the 2001 Population and Housing Census of Namibia

(Source: CBS, 2001 Population and Housing Census).

Age of	**Nr. Women**			**Nr. Births**		
Mother	Urban	Rural	**Total**	Urban	Rural	**Total**
15 - 19	30482	72509	102991	1277	3901	5278
20 - 24	36109	51993	88102	3827	8137	11964
25 - 29	36319	40160	76479	4389	6667	11056
30 - 34	28461	32943	61404	3217	5212	8429
35 - 39	22550	28783	51333	1793	3499	5292
40 - 44	16186	23694	39880	613	1770	2383
45 - 49	10961	19846	30807	120	561	681
Total	**181068**	**269928**	**450996**	**15336**	**29747**	**45083**

4.2.1) Calculate the Crude Birth Rate (CBR) for the total population of Namibia. Use the midyear population, P = 1 830 330 (4)

4.2.2) Calculate the General Fertility Rate (GFR) (4)

4.2.3) Calculate the age-specific fertility (ASFR) rates for each age cohort (7)

4.2.4) Calculate the Total Fertility Rate (TFR) for the total population of Namibia (4)

4.2.5) Calculate the Child Women Ratio (CWR) for the total population of Namibia. Use the midyear population, P = 1 830 330 with child (0 – 4)yrs population of 98 460 (3)

xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx