

**UNIVERSITY OF SWAZILAND**

**MAIN EXAMINATION**

**ACADEMIC YEAR: 2012/2013**

**TITLE OF PAPER: DEMOGRAPHIC METHODS**

**CORSE NUMBER: DEM 202**

**TIME ALLOWED: 3 HOURS**

**INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO FROM SECTION B. ALL QUESTIONS ARE WORTH 25 MARKS EACH.**

**REQUIREMENTS: CALCULATOR**

**THIS PAPER SHOULD NOT BE OPENED UNTIL PERMISSION HAS BEEN GIVEN BY THE INVIGILATOR**

## SECTION A (Compulsory)

### Question 1

- a) Define a parity progression ratio and present a formula for its calculation (3)
- b) Use the information in Tables 1 and 2 to answer the following questions:
  - i. Calculate the parity progression ratios. (9)
  - ii. Calculate the cohort total fertility rate using the above calculated parity progression ratios. (2)
  - iii. Calculate the total fertility rate using the age-specific fertility rate approach. (2)
  - iv. If as a result of a family planning campaign, the age-specific fertility rate for the age group 35-39 were reduced by 40%, by what percentage would the fertility rate be reduced? (3)
  - v. Compute the gross reproduction rate, assuming that the sex ratio at birth is 104. (2)

c) A certain hypothetical population has the following parity progression ratios:

$$P_1 = 0.89$$

$$P_2 = 0.85$$

$$P_3 = 0.81$$

Assuming that no woman in this cohort has a fourth child, out of 1000 women, how many have at least 1 child and how many have exactly one child? (4)

**Table 1: Distribution of women by Number of Children Ever Born, Swaziland, 1976**

Number of CEB	Number of Women
0	35,217
1	15,332
2	13,565
3	12,387
4	11,770
5	11,285
6	10,029
7	8,733
8	7,362
9+	5,413

**Table 2: Age Specific Fertility Rates, Swaziland, 1976**

Age	ASFR
15-19	0.169
20-24	0.318
25-29	0.311
30-34	0.264
35-39	0.198
40-44	0.096
45-49	0.014

**Question 2**

- a) Why is it necessary to standardize rates? (2)
- b) The standardized mortality ratio for the town of Burnley in England was 1.23 when the population of England as a whole was used as the standard. What does this tell you about the mortality in Burnley relative to that in England as a whole? (5)
- c) Why do we decompose rates? (2)
- d) The difference in the crude death rates for Mauritius and Germany is partly due to mortality differences and partly due to differences in their age composition. Find the contribution of each of these two components using the data below. (16)

**Table 3: Population and deaths (in thousands) by Age for Mauritius and Germany**

Age	Mauritius		Germany	
	Population	Deaths	Population	Deaths
Under 1	10.2	0.510	302.8	6.1
1-4	39.2	0.116	1320.0	1.1
5-14	112.0	0.066	4968.0	2.1
15-24	98.3	0.102	4516.7	6.7
25-34	59.2	0.152	4207.4	6.4
35-44	39.7	0.228	4709.9	13.9
45-54	36.8	0.437	3508.6	25.6
55-64	23.4	0.838	2412.7	19.4
65+	14.1	1.422	3368.7	253.0

**SECTION B (Answer any 2 questions)**

**Question 3**

- a) A net nuptiality table is a type of double decrement life table. Which are the two forces of decrement, and which state is being decremented? (3)
- b) Briefly describe how you would compute the mean age at first marriage, mentioning the data that are needed. (5)
- c) Populations that have a low age at first marriage tend to have relatively higher levels of fertility. Discuss this statement. (5)
- d) Provide the formula for computing the singulate mean age at marriage, defining all the components of the formula. (6)
- e) Calculate the singulate mean age at marriage for males and females in Mali using the data in Table 4. (6)

**Table 4: Proportion single by age and sex, Mali, 1995-96**

Age	Males	Females
15-19	99.6	98.6
20-24	89.1	77.7
25-29	58.6	42.9
30-34	33.2	21.7
35-39	20.8	12.5
40-44	13.7	8.4
45-49	10.9	6.5
50-54	10.0	7.0

**Question 4**

- a) It is often said that women generally live longer than men. Discuss this statement. (6)
- b) Describe as clearly as you can the cohort method for adjusting the conventional infant mortality rate, giving the relevant formula as well. (5)
- c) If a depressed person jumps off a bridge and drowns, what will be the single cause of death recorded in vital statistics? (2)
- d) The table below gives the number of births, deaths of infants under 1 year and deaths of infants under 28 days (4 weeks) in the UK in selected calendar years.
  - i. Calculate the percentage of infant deaths in each year that were neonatal deaths.(4)

- ii. Calculate the infant and neonatal mortality rates for each year .(8)

**Table 5: Number of births and infant deaths, United Kingdom, selected years**

Year	Number of births	Number of deaths under 1	Number of deaths under 28 days old
1991	792500	5820	3460
1995	732000	4520	3070

**Question 5**

- a) Describe the sources of data for migration analysis.(5)
- b) Using the vital statistics method, calculate the intercensal net migration to or from the following places: (4)

	1996 census	2001 census	Births	Deaths
Greenlane	22400	22100	1872	1018
Kensington	44150	48700	4131	1448

- c) Using forward survival, calculate age-specific net migrants and rates for the age groups 10-14 and 20-24. (6)

Age in 1976	Age for survival ratio	${}_5S_x$	Population 1976	Population in 1986
0-4	10-14	1.0612	17286	17297
5-9	15-19	0.8879	17129	12013
10-14	20-24	0.8036	13889	7689
15-19	25-29	0.9344	9084	6087
20-24	30-34	0.9823	5693	4613
25-29	35-39	0.9369	5615	4834

- d) Give 2 assumptions of a stable population. (4)
- e) Using the data in Table 7, calculate the intrinsic rate of natural increase. (6)

**Table 7: ASFRs and survival probabilities for country X**

Age group	Female ASFRs	Survival Probabilities
15-19	0.01289	0.98615
20-24	0.05007	0.98376
25-29	0.07120	0.98134
30-34	0.03947	0.97877
35-39	0.01205	0.97530
40-44	0.00215	0.96960
45-49	0.00012	0.96003

**Question 6**

- a) Distinguish between generation and abridged life tables. (4)
- b) Using the life table below, compute the following life table indices showing clearly the notation and formulae used:

- i.  $l_{10}$  (2)
- ii.  ${}_1d_0$  (2)
- iii.  ${}_5L_5$  (2)
- iv.  $T_1$  (2)
- v.  $T_{15}$  (2)
- vi.  $e_{15}$  (2)

**Table 8: Abridged life table for country X**

Age	$nq_x$	$l_x$	${}_nd_x$	$nL_x$	$T_x$	$e_x$
0-1	0.03168	100000		97782	6997475	69.97
1-4	0.00793	96832	768	385793		
5-9	0.00344	96064	331		6513900	67.81
10-14	0.00280		268	477998	6034406	63.03
15-19	0.00444	95466	424	476269		
20-24	0.00613	95042	583	473752	5080139	53.45
25-29	0.00747	94459	706	470531	4606386	48.77
30-34	0.00911	93753	854	466632	4135855	44.11

- c) What type of data would be needed to implement a cohort component projection for your country of residence? (3)
- d) You have been asked to prepare a projection of the number of children aged 0-4 in 2015 that survive from births in 2010. Describe in detail the data you would require to make your projection and the approach you would adopt. (6)