UNIVERSITY OF SWAZILAND

SUPPLEMENTARY EXAMINATION 2015

TITLE OF PAPER: DEMOGRAPHIC METHODS

COURSE NUMBER: DEM 202

TIME ALLOWED: 3 HOURS

INSTRUCTIONS: ANSWER ANY FOUR QUESTIONS. ALL QUESTIONS ARE WORTH 25 MARKS EACH.

REQUIREMENTS: CALCULATOR

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

Question 1

a) Why is it necessary to decompose rates? (2)

b) The data below shows the population in England and Wales, Scotland and Northern Ireland in 1981. The number of deaths in England and Wales are shown. The total number of deaths in Scotland and Northern Ireland in 1981 was 63800 and 16300 respectively.

I. Calculate the crude death rates in England and Wales, Scotland and Northern Ireland in 1981. (6)

II. Compare the mortality experiences of the three populations, i.e. calculate the standardized indices. (15)

III. Comment on your results. (2)

Table 1: Population (in thousands) and Deaths by age

	England and Wales		Scotland	North Ireland
Age group	**Population**	**Deaths**	**Population**	**Deaths**
0-4	3006	8200	317	131
5-24	14958	6280	1655	552
25-44	13082	14730	1326	375
45-64	11040	101500	1140	296
65-74	4619	155000	459	116
75-84	2388	190400	232	56
85+	541	102400	49	13

Question 2

a) The number of females in 2002 of the population of the United States and the number of male births occurring to them throughout the year are given in the table below. The sex ratio at birth is 105.

Table 2: Female population by age and births, USA, 2002

Age Group	No. of Women	Male births	$_nL_x/l_0$
15-19	9 895 186	217 640	0.9907
20-24	9 865 888	522 807	0.9887
25-29	9 334 428	542 390	0.9863
30-34	10 395 836	486 549	0.9833
35-39	10 964 420	232 184	0.9788
40-44	11 540 723	48 996	0.9718
45-49	10 448 000	2 672	0.9614

I. Discuss the age pattern of fertility for this population. Make sure to include an illustration of the fertility curve. (10)

II. Calculate:

- The total fertility rate and interpret it. (3)

- The Gross Reproduction rate using the indirect method (3)
- The Net Reproduction rate and interpret. (6)

b) Is a stationary population also a stable population? Explain your answer. (3)

Question 3

a) A net nuptiality table is a type of double-decrement life table. Which are the two forces of decrement, and which is the state being decremented? (3)

b) Define any 5 **gross nuptiality** table functions and present the formula for calculating each function.(10)

c) Using the data in Table 3, calculate the mean age at first marriage.(4)

Table 3: Number of first marriages for females, England and Wales, 1991

Age	No of first marriages
15-19	17 704
20-24	103 689
25-29	72 523
30-34	21 000
35-39	5785
40-44	2075
45-49	911

d) Provide the formula for computing the singulate mean age at marriage (SMAM), defining all the components of the formula. (8)

Question 4

a) Using the data in Table 4, calculate the following:

I. Out-migration rates for each region (4)
II. The in-migration rates for each region (4)

Table 4: Enumerated population classified by region of birth and region of residence.

	Region of Residence/Enumeration			
Region of birth	A	B	C	**Total**
A	74609	526	21	**75156**
B	4899	32688	825	**38412**
C	191	1180	22612	**23983**
Total	**79699**	**34394**	**23458**	**137551**

b) What is meant by population projection? (3)

c) Describe two uses of population projections. (4)

d) Using the data in Table 4, calculate the number of births born to women aged 15-49 that survive to be aged 0-4 in 1986. (10)

Table 4: Indian Female Population by Age and ASFR

Age group	Population 1981	Population 1986	ASFR
15-19	33 163 600	38 882 496	0.0436
20-24	28 482 300	32 498 670	0.1242
25-29	25 072 700	27 787 902	0.1127
30-34	21 734 600	24 377 183	0.0795
35-39	18 950 900	21 050 612	0.0468
40-44	16 452 800	18 271 889	0.0236
45-49	13 960 400	15 762 934	0.0115

Additional Information: Survivorship ratio is 0.88827

Question 5

a) Why is the study of mortality of utmost importance? (10)

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) The table below gives the numbers of births, deaths of infants aged under 1 and deaths of infants aged under 4 weeks in the UK in selected years.

I. Calculate the percentage of infant deaths in 1971 and 1976 which were neo natal deaths.(4)

II. Calculate the neonatal mortality rates for each year. (6)

Year	Number of Births	Number of deaths under 1 year	Number of deaths under 4 weeks old
1971	901600	16200	10800
1976	675500	9790	6680
1981	730800	8160	4930

Question 6

a) Use the period life table below to answer the following questions:
   (i) Compute the gaps numbered (i) to (v). For each computation, give the notation and formula, where applicable. (9)
   (ii) How many years would a person who survives to age 30 expect to live in the age interval 30-60? (2)
   (iii) What is the probability of dying between exact age 15 and 35? (2)
   (iv) What is the life expectancy at age 25? In addition, give a verbal interpretation. (2)

b) Now, conceive of the life table as a stationary population. Answer the following questions:
   (i) What is the total size of the population? (2)
   (ii) What is the crude birth rate? (2)
   (iii) What is the death rate above age 70? (2)
   (iv) What is the mean age at death? (2)
   (v) What is the annual number of births and deaths? (2)

Table 3: Abridged life table for England and Wales females, 1985

Age	n	${}_nq_x$	l_x	${}_nd_x$	${}_nL_x$	T_x	e_x
0-1	1	0.008252	100000	825	99258	7756261	77.56
1-4	4	0.001630	99175	162	396311	7657003	77.21
5-9	5	0.000905	99013	89	494842	7260692	73.33
10-14	5	0.000935	(i)	93	494388	6765850	(v)
15-19	5	0.001409		(ii)		6271462	63.46
20-24	5	0.001534	98692	152	493080	5777654	58.54
25-29	5	0.001818	98540	179	492253	5284574	53.63
30-34	5	0.002826	98361	278	491110	4792321	48.72
35-39	5	0.004410	98083	432	(iii)	4301211	43.85
40-44	5	0.007199	97651	693	486523	3811876	39.04
45-49	5	0.012348	96958	1197	481798	3325353	34.30
50-54	5	0.020831	95761	2005	473793	2843555	29.69
55-59	5	0.035455	93756	3324	460470	2369762	25.28
60-64	5	0.058507	90432	5291	438933	1909292	21.11
65-69	5	0.087310	85141	7434	407120	1470359	17.27
70-74	5	0.139189	77707	10816	361495	1063239	13.68
75-79	5	0.220993	66891	14782	297500	701744	10.49
80-84	5	0.352367	52109	18362	214640	404244	7.76
85+	5	1.000000	33747	33747	189604	(iv)	5.62