UNIVERSITY OF SWAZILAND

MAIN EXAMINATION PAPER 2015

TITLE OF PAPER	**:**	**POPULATION ESTIMATES AND PROJECTIONS**
COURSE CODE	**:**	**DEM 301**
TIME ALLOWED	**:**	**TWO (2) HOURS**
INSTRUCTION	**:**	**ANSWER ANY THREE QUESTIONS**
REQUIREMENT	**:**	**SCIENTIFIC CALCULATOR**

Question 1

a. Distinguish between demographic rates and ratio, give examples of each [4]

b. Why is the demographic "balancing equation" so named? [2]

c. Why are demographic rates often used in preference to figures on total numbers of births and deaths ? [2]

d. A country of Transylvania had 3.5 million people. In the year after the last census, there were 110 900 new children born and 113,000 people died.

i. Assuming a sex ratio of 1.05, how many of the Transylvania births are female? [2]

ii. What are the birth and death rates? [4]

iii. What is the population growth rate? [3]

iv. In how many years will the population double, using the exponential growth model? [3]

Question 2

Table 1: Age specific fertility rates and female population for an African country, 2005-2015

Age of mothers	Age specific fertility rates (f_a)			Population (P_a)		
	2005	**2010**	**2015**	**2005**	**2010**	**2015**
15-19	152	110	103	1, 497	1,856	1,761
20-24	314	257	238	1,321	1,691	1,715
25-29	303	241	216	1,334	1,382	1,454
30-34	255	197	175	982	1,086	1,209
35-39	183	154	118	898	871	877
40-44	99	70	50	674	788	768
45-49	35	20	12	445	521	661

Use the data in Table 1 and apply Method B of the Period Fertility Method to calculate;

a. Expected births in 2005, 2010 and 2015 [9]

b. Projected medium births in 2005, 2010 and 2015 [6]

c. Projected medium female birth for the five year period, 2005-2010 and 2010-2015 [5]

[20 marks]

Question 3

Explain the cohort component method for projecting an open population, focussing on the following;

a. Definition [2]
b. General principles of computation [3]
c. Data requirements [3]
d. Modelling approach including the computational procedure for all the other age groups except for the youngest and open-ended age groups [12]

[20 marks]

Question 4

a. What is population momentum? [2]

b. How can a population have a positive growth rate and a negative intrinsic growth rate? [2]

c. Use the data in Table 2 to calculate the measures given below:

Table 2: Female age-specific birth rates and probabilities of survival for a Western population, 2000

Age group	Female ASFRs	Probability of survival
15-19	0.01070	0.98612
20-24	0.04357	0.98375
25-29	0.06965	0.98134
30-34	0.04309	0.97876
35-39	0.01312	0.97529
40-44	0.00214	0.96957
45-49	0.00000	0.00000

Sex ratio at birth (SRB): 1.03

i. Total fertility rate [2]
ii. Net reproduction rate [3]
iii. Mean length of a generation [3]
iv. Intrinsic rate of natural increase [4]

d. Assuming that a stable population has an intrinsic growth rate of 1.3% and had 82 704 births in 2012. Using the exponential progression, estimate the births in the following years;
   i. 1987 [2]
   ii. 2023 [2]

[20 marks]