University of Colombo
Faculty of Arts
Bachelor of Arts Degree Examination (Special) – Fourth Year
Semester End Examination – Semester II – 2017/2018
DMG 4261: Population Models and their Applications

Answer three (03) questions only   **Time: Two (02) hours**
Calculators can be used
This paper contains five (05) questions and 03 pages

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1. a) Explain, what is meant by a Population Model.

   (03 Marks)

   b) Explain the two types of causes of demographic phenomena citing an example from each type.

   (08 Marks)

   c) Explain the uses of population models.

   (09 Marks)

2. a) Explain in which situations where arithmetic, geometric, exponential and logistic growth models could be used in analyzing the population growth of a country.

   (10 Marks)

   b) Examine the practicability of using Bongarrt's Framework in analyzing fertility of a country.

   (10 Marks)

3. a) Explain the characteristics of a stationary population model.

(05 Marks)

b) Annually 450 female workers are recruited for garment factory "Z". While the employed population of this industry has shown stationary population characteristics for number of years, female workers are recruited at the age of 18 years. Calculate the following using the Life Tables provided.

   i) What is the total number of female employees of the age group 50-65?

   ii) How many female employees are retired annually if the retirement age is 65 years?

   iii) What is the total number of employees in the factory?

   iv) How many retired female employees are recorded in this factory?

   v) If 10% of the workers leave the industry at the age 21 years, what would be the answers for sections (i) to (iv) above?

(15 Marks)

4. a) Explain the characteristics of a stable population.

(05 Marks)

b) What are the uses of stable populations for demographers?

(05 Marks)

c) The following table shows the growth of a non-human population. Births of this population are growing at a constant annual rate of growth. It assumes that everyone dies before age 5.

Age	01.01.1800	01.01.1801	01.01.1802	01.01.1803	01.01.1804	01.01.1805	01.01.1806
0	1000	$1000.e^{r}$	$1000.e^{2r}$	$1000.e^{3r}$	$1000.e^{4r}$	$1000.e^{5r}$	$1000.e^{6r}$
1		600	$600.e^{r}$	$600.e^{2r}$	$600.e^{3r}$	$600.e^{4r}$	$600.e^{5r}$
2			400	$400.e^{r}$	$400.e^{2r}$	$400.e^{3r}$	$400.e^{4r}$
3				200	$200.e^{r}$	$200.e^{2r}$	$200.e^{3r}$
4					50	$50.e^{r}$	$50.e^{2r}$
5						0	0

Explain how the population in this table becomes a stable population starting from 1805.

(10 Marks)

2

5. a) Calculate the Intrinsic Growth Rate for country X with the use of the data given in the following table:

Age group	Age Specific Fertility Rate	Probability of survival
15-19	0.01317	0.97921
20-24	0.04322	0.97611
25-29	0.07800	0.97422
30-34	0.07154	0.97233
35-39	0.02922	0.96480
40-44	0.00511	0.95732
45-49	0.00010	0.94623

Formulae to be used for calculation:

$$r = \ln R_0 / (R_1 / R_0 - 0.7 \ln R_0)$$

(15 Marks)

b) What are the main characteristics of Coale-Demeny Regional Model Life Tables?

(05 Marks)