JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICS AND ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR DEGREE OF BACHELOR OF EDUCATION ARTS, SPECIAL EDUCATION AND EDUCATION SCIENCE

2ND YEAR 2ND 2018/2019 ACADEMIC YEAR

REGULAR (MAIN)

COURSE CODE: SAS 204

COURSE TITLE: STATISTICAL DEMOGRAPHY I

EXAM VENUE: **STREAM: (B.sc ACTUARIAL SCIENCE)**

DATE: 2/5/19 **EXAM SESSION: 3.00 – 5.00pm**

TIME: 2.00 HOURS

Instructions:

1. **Answer question 1 (Compulsory) and ANY other 2 questions**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 MARKS)

a) Outline FOUR importance of demographic data. (4Marks)

b) Use the table below to answer the questions below

Age	l_x	d_x	$1000q_x$
0	1,000,000	1580	1.58
1	998,420	680	0.68
2	997,740	485	0.49
3	997,255	435	0.44

Assuming a uniform distribution of deaths over each year, find the following.

i. ${}_{4/3}p_1$ (3 Marks)

ii. The probability that a newborn will survive the first year, but die in the first two months thereafter. (2Marks)

c) Explain FIVE uses of vital statistics obtained from civil registration. (5 Marks)

d) In a certain population there are 52, 403 births with sex ratio of 104 males to 100 females. Find the number of female and the number of male births. (4 marks)

e) In a given population the number of persons recorded at a census was 160, 000. The number of births and deaths recorded that year in the same population were 8,000 and 3,200 respectively. Calculate the crude death rate and crude birth rate assuming the census took place at midnight 30th June. (4 Marks)

f) Explain FOUR measures of fertility. (8 Marks)

QUESTION TWO (20 MARKS)

a) Outline FOUR uses of population projections. (4 Marks)

b) The table below represent information of a given population. Use it to answer the following questions. (16 Marks)

Age	15-19	20-24	25-29	30-34	35-39	40-44	45-49
No. of women ${}_n^f p_x \times 1{,}000$	26	26.4	25.8	25.2	24.5	25.0	24.5

i. For each group complete the table for another column involving ASFR

ii. Compute

- GFR
- TFR
- GRR

QUESTION THREE (20 MARKS)

a) Explain FOUR techniques used in estimating population projections. (8 Marks)

b) Define a life table. (2 Marks)

c) Given $l_x = 1000\left(1 - {}^{x}/_{105}\right)$ determine each of the following

i. l_0

ii. l_{35}

iii. q_{20}

iv. ${}_{15}p_{35}$

v. ${}_{15}q_{25}$

vi. The probability that a 30-year old dies between ages 55 and 60.

vii. The probability that a 30-year old dies after age 70.

QUESTION FOUR (20 MARKS)

a) Outline steps used in constructing a life table. (7 Marks)

b) The official Kenya population estimate for mid-1965 was 194,303,000 and for mid-1970 was 204,879,000. Extrapolate the population of 1975 assuming it has;

i. fixed absolute increase (4 Marks)

ii. fixed ratio increase. (4 Marks)

c) Given the data below calculate the natural increase of the population. (5 Marks)

Item	
Population on 1st January at time t	10,554
Births	456
Deaths	215
Immigration	40
Emigration	145
Population on 1st January at time t+1	10,690

QUESTION FIVE (20 MARKS)

The following table is from part of a population

AGE	${}^{f}_{n}P_x$	${}_{n}B_x$	${}_{n}i_x$
15-19	_____	20,836.62	98
20-24	198,732	_____	169.6
25-29	162,800	25,628.4	_____
30-34	145,362	5,770.87	_____
35-39	128,109	_____	98.6
40-44	106,211	_____	42.8
45-49	_____	1,466.13	16.9
TOTAL	1,040,586	104,584.35	623

a) Complete the table above

b) Use the information to calculate the General Fertility Rate and Total Fertility Rate

c) Given that Gross Reproduction Rate is approximated as $^{100}\!/_{106}$ of Total Fertility Rate. What will be its value