MACHAKOS UNIVERSITY

University Examinations 2018/2019

SCHOOL OF PURE AND APPLIED SCIENCES
DEPARTMENT OF MATHEMATICS, STATISTICS AND ACTUARIAL SCIENCE

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF SCIENCE (STATISTICS AND PROGRAMMING)

SST 400: DEMOGRAPHY

DATE: 7/5/2019 **TIME: 8:30 – 10:30 AM**

INSTRUCTIONS:

Attempt question one and any other two questions

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Consider the following data on fertility of some female population

Age group of

Child bearing females	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Number of women (×1000)	16.0	16.4	15.8	15.2	14.8	15.0	14.5
Total births	260	2244	1894	1320	916	280	145

Assuming that the population of female births is 46.2%, compute

i) the General Fertility Rate (G.F.R.) (5 marks)

ii) The Total Fertility Rate (T.F.R.) (4 marks)

iii) The age Specific Fertility Rates (S.F.R.) (7 marks)

b) Show that $q_x = \dfrac{m_x}{1+\dfrac{m_x}{2}}$ (3 marks)

c) Suppose from mortality table ℓ_{20} = 693,435 , T_{20} = 35,081,126 and

ℓ_{21} = 690,673

Calculate (i) L_{20} (ii). e^{0}_{20} (6 marks)

d) Define the following terms

i) Crude Death Rate. (C.D.R.)

ii)Total Fertility Rate. (T.F.R.)

iii) Standardized Death Rate. (S. D. R.) (6 marks)

QUESTION TWO (20 MARKS)

a) Suppose census records and death registration data are available. Explain, using life table functions, how you would construct a life table from the data.

(7 marks)

b) Consider the following table of values of e_x .

Age, x	75	76	77
e_x	10.5	10.0	9.5

Calculate the probability that a life aged 75 will die by age 78. (5 marks)

c) Given that the complete expectation of life at ages 30 and 31 for a particular group of lives are respectively 21.39 and 20.91 years and that the number living at age 30 is 41,176.

Calculate

i) the number that attains age 31. (4 marks)

ii) the number that will die without attaining the age 31. (4 marks)

QUESTION THREE (20 MARKS)

Consider the mortality data for the standard population and population A given in the following table.

	Standard Population		Population A	
Age	**Population in 1000s**	**Specific Death Rate**	**Population in 1000's**	**Specific Death Rate**
0-5	8	50	12	48
5-15	10	15	13	14
15-50	27	10	15	9
50+	5	60	10	59

Compute the standardized death rate by

a) the Direct method (10 marks)

b) the Indirect method (10 marks)

QUESTION FOUR (20 MARKS)

Calculate the general fertility rate and the total fertility rate from the data given in the table below, assuming that for every 100 girls 106 boys are born.

Age of women	Number of women	Age-specific rate
15-19	212,619	98.0
20-24	198,732	169.6
25-29	162,800	158.2
30-34	145,362	39.7
35-39	128,109	98.6
40-44	106,211	42.8
45-59	86,753	16.9

QUESTION FIVE (20 MARKS)

a) Define, for a given population,

i) the gross reproduction rate (3 marks)

ii) The net reproduction rate. (3 marks)

b) Consider the following data on age specific fertility and survival rates.

Age (Years)	15-19	20-24	25-29	30-34	35-39	40-44	45-49
Fertility rate	0.0108	0.0662	0.0675	0.0413	0.0216	0.0063	0.0004
Survival Rate	0.963	0.967	0.963	0.958	0.952	0.942	0.928

Compute

i) the gross reproductive rates (7 marks)

ii) the net reproduction rates. (7 marks)