



MERU UNIVERSITY COLLEGE OF SCIENCE & TECHNOLOGY

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University Examinations 2011/2012

FIRST YEAR, FIRST SEMESTER EXAMINATION FOR THE DEGREE OF MASTER OF
SCIENCE IN APPLIED STATISTICS

STA 3110: DEMOGRAPHY AND VITAL STATISTICS

DATE: JANUARY 2012

TIME: 3 HOURS

INSTRUCTIONS: Answer *Question one* and any other *two* questions

QUESTION ONE

- Briefly define Demography and explain its importance to National Planners.
- Define the following terms and phrases as used in Demography and vital statistics:
 - Rate
 - Demographic Technique
 - Crude Birth Rate (CRR)
 - Sex Ratio (SR)
- Vital statistics are commonly used in Demographic studies. What is the motivation behind referring to these statistics as VITAL?
- What are life-tables and why would a statistician be interested in using them?
- In the life table below, use the usual definitions of the life table functions and their relationships to fill up the missing entries.

x	l_x	d_x	$1000q_x$	L_x	T_x	e_x
25	78046					39.60
26	77614	470				
27	77144					
28	76723	465				
29	76258					
30				75532	2705310	

QUESTION TWO

- Given a brief explanation of what the following terms/phrases mean in Demographic studies: immigration, Emigrant, internal migration and population growth.
- Assume that you have requested to carry out a Demographic study in regard to immigration patterns in a certain area. What are the main questions that you would capture in your questionnaires?
- Suppose that the population of a country is quoted as being 6449558 in 1979 and 9456466 in 1989. Using the idea of population projections, find the mean annual Rate of population increase for this country, the population in 1987, the population in 1995 and the doubling time of this population.

QUESTION THREE

- Using the basic Demographic equation $\int_0^{\infty} e^{-rx} p(x)f(x)dx = 1$, show that the age structure in a stable population is also stable and that $c(x) = be^{-rx}p(x)$ where the symbols have their usual meaning in Demography.
- Suppose that there is a stable female population with the following features: the birth rate is 35.2%, the rate of increase is 2% per annum and the proportion of surviving to age **a** is $1 - \frac{a}{100}$ as from January 1st 2002, the fertility switches to a constant rate of birth. The mortality schedule is unaltered.
 - What is the expectation of life at birth
 - How large is the ultimate population relative to the population at mid-night of December 31st, 2001? (All the measurements are done in 000's)

QUESTION FOUR

- What are the main uses of the Sex Ratio at Birth (SRB)?
- How would this ratio help demographers to report on death rates?
- Carefully explain the meaning of Rate of Natural increase as used in Demographic Studies.
- Compute the rate of natural increase from the following summarized information

Population as at 1st Jan 2000 is 10554, and then during the year 2000, we have that;

Births	456
Deaths	215
Immigrants	40
Emigrants	145

The population as at 1st Jan 2001 is 10690