UGANDA MARTYRS UNIVERSITY
NKOZI

FACULTY OF SCIENCE

DEPARTMENT OF MATHEMATICS AND STATISTICS

SUPPLEMENTARY/SPECIAL EXAMINATIONS

UNIVERSITY EXAMINATIONS
AUGUST 2014

YEAR THREE-GEN

SAMPLNG THEORY

DATE: 13TH AUGUST 2014

TIME: 2:00 - 5:00 PM
DURATION: 3 HRS

Instructions:

i) Attempt four Questions
ii) Read through the paper carefully and follow the instructions on the answer booklet
iii) Start with questions you find easiest and not necessarily those that carry most marks
iv) Neat work is highly recommended.

1. (a) Define the following terms as applied sampling theory

(i) Statistics

(ii) Sample

(iii) Sampling frame

(iv) Sampling unit

(v) Questionnaire

(vi) Confidence interval

(vii) Sample survey

(viii) Sampling design

(b) Distinguish between probability sample and non probability sample. In each case give the examples.

2. (a) List all different methods that can be used to determine samples from a population.

(b) What is design effect and when can this be used?

© In a sero-behavioural survey of financial year 2010/2011 conducted in Uganda, the following was considered to be the determinants.

1. The current estimated prevalence of HIV/AIDS, which is 42%
2. Design effect assumed to be 2 from the standard practice
3. From previous studies, the response rate was estimated to be 80%
4. Taking a confidence level of 95%, and the relative error to be 5% for the national sample size. **(Z-critical =1.96)**

REQUIRED

Estimate the sample size in this study.

3 (a) Distinguish between Sampling and non-sampling errors as applied to sampling theory.

(b) How can each of the above be minimized?

© A SRS of 10 farmers selected from an Enumeration Area with the population of 100 farmers gives the following data

Farmer (i)	1	2	3	4	5	6	7	8	9	10
No. of Fields (Yi)	2	4	1	3	3	2	4	3	1	2

Determine

(i) average number of fields per farmer and its standard error

(ii) Proportion of farmers with less than 3 fields and its standard error.

4. (a) Explain the following terms as applied to sampling theory

(i) Ratio estimator

(ii) The classical ratio estimator of the population mean

(iii) Regression estimator

(iv) Sample correlation coefficient

(b) A complete census of the value of manufacturing shipments was taken in 2010. The following table gives the value of shipments in each of a SRS of the value of 10 shipments drawn from the value of 30 shipments. The problem is to estimate the total value of the shipments in 2010. The value of 2009 total (X) is assumed to be known. Its value is Shs. 19.5 billions

The table below gives the value of shipments in 2009 and 2010

Value in 2009 (xi)	0.3	1.1	0.5	0.4	1.0	0.7	0.2	0.3	2.4	0.1
Value in 2010 (yi)	0.1	0.6	0.8	0.6	1.0	0.8	0.9	0.8	2.7	0.2

Determine

(i) The ratio estimate for the total

(ii) Variance and the standard error of the estimate

5. (a) State the limitations of SRS design

(b) (i)What is estimation?

(ii) Identify and give brief explanation of population parameters commonly used in estimation

© A simple random sample of 2 fields is selected from 5 fields belonging to a household with sizes as follows

Field	1	2	3	4	5
Size (Acres)	156	649	86	164	253

Calculate (i) Population mean

(iii) Population variance and standard error.