(Knowledge for Development)

KIBABII UNIVERSITY

UNIVERSITY EXAMINATIONS

2017/2018 ACADEMIC YEAR

SECOND YEAR FIRST SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF BACHELOR OF SCIENCE

(MATHEMATICS)

COURSE CODE: STA 243

COURSE TITLE: SAMPLE SURVEY I

DATE: 12/01/18 **TIME:** 9 AM -11 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

Question 1 Compulsory (30 marks)

a) State four physical layout of a questionnaire (4 marks)

b) What are advantages of sampling survey over census. (4 marks)

c) A research student wishes to investigate the average prevalence of HIV/AIDS among youth living in slum dwellings in Kenya.

Required;

(i) Suggest a suitable sample frame. (1 mark)

(ii) Describe a suitable sampling method that could be used to achieve this purpose. (2 marks)

d) A population has size N = 6 where the values of characteristic X are 4, 9, 5, 11, 7 and 12. A sample of size n = 2 is to be selected for estimating population mean $\overline{\mathbf{Y}}$.

(i) List the possible samples with their corresponding means. (5 marks)

(ii) Verify that the sample mean $\bar{y}$ is unbiased estimator of the population mean $\overline{\mathbf{Y}}$ and

That its variance is given by $\frac{S^2(N-n)}{nN}$ (8 marks)

e) Starting two examples of each, explain the difference between Probability sampling and non-probability sampling (4 marks)

f) Distinguish between cluster sampling and stratified sampling. (2 marks)

Question 2 (20 marks)

a) State three situations under which optimum allocation can be applied in stratified random sampling. (3 marks)

b) A population has three strata with corresponding sizes, means and variances as follows;

	Ni	$\overline{y_i}$	s_i^2
Stratum 1	320	8	25
Stratum 2	200	12	9
Stratum 3	480	10	4

(i) Obtain proportional and Neyman allocation if a stratified sample of 150 is to be drawn to estimate the population mean. (8 marks)

(ii) Obtain the population mean and variance. (9 marks)

Question 3 (20 marks)

a) Show that the sample mean ($\bar{y}$) is a unbiased estimator of the population mean ($\bar{Y}$) and show that its variance is given by $\frac{s^2(N-n)}{nN}$. (13 marks)

b) The following observations are assumed to be from a normal population.
6, 22,19, 10, 11, 17, 9, 4, 13, 28 and 3

(i) Estimate the population mean (3 marks)

(ii) Determine the 95% confidence bounds for the population mean. (4 marks)

Question 4 (20 marks)

a) Give three advantages and disadvantages of simple random sampling. (6 marks)

b) A survey is to be made up of the prevalence of the common disease in a large population. For any disease that affects at least 1% of the individuals in the population, it is desired to estimate the total number of cases with a coefficient of variation of not more than 20%.Calculate the size of simple random sample which is needed assuming that the presence of the disease can be recognized without mistakes? (8 marks)

c) Prove that sample proportionp is an unbiased estimator of the population proportion P. (6 marks)

Question 5 (20 marks)

a) Differentiate between the following terms;

(i) Sampling errors and non - sampling errors (2 marks)
(ii) Pretest and pilot test (2 marks)
(iii) Simple random sampling with replacement and simple random sampling without replacement. (2 marks)

b) Explain the main advantages of using a questionnaire as a method of collecting data

(6 marks)

c) The final step in the sample survey process is to present research findings. This is one of the most important aspects of a survey research since it is the key in communicating findings to those who can make decisions to take action on the results. Discuss in logical sequence, the main sections of a good research report. (8marks)