



(Knowledge for Development)

KIBABII UNIVERSITY
UNIVERSITY EXAMINATIONS
2022/2023 ACADEMIC YEAR
SECOND YEAR SECOND SEMESTER
MAIN EXAMINATION
FOR THE DEGREE OF BACHELOR OF SCIENCE
MATHEMATICS

COURSE CODE: STA 121

COURSE TITLE: SAMPLE SURVEYS I

DATE: 18/4/2023

TIME: 9:00 AM - 11:00 AM

INSTRUCTIONS TO CANDIDATES

Answer Question One and Any other TWO Questions

TIME: 2 Hours

QUESTION ONE (30 MKS)

- a) Define the following terms (6mks)
- Census
 - Sampling unit
 - Sampling frame
- b) What are the advantages of sampling over complete enumeration? (4mks)
- c) State and explain three principles of sampling (6mks)
- d) Deduce two merits and two demerits of census (4mks)
- e) Describe four situations where census is essential (4mks)
- f) List the steps followed in sample survey (6mks)
- g) Discuss the procedure of stratified random sampling. Give examples. (2mks)
- h) What are the conditions under which the cluster sampling is used (2mks)

QUESTION TWO (20 MKS)

- a) Define purposive sampling. Where is it used? (2mks)
- b) What is a random number table? How will you select the random numbers? (4mks)
- c) In an area there are 500 families. Using the following extract from a table of random numbers select a sample of 10 families to find out the standard of living of those families in that area. (6mks)
- | | | | | | | | | | | |
|------|------|------|------|------|------|------|------|------|------|------|
| 4652 | 3819 | 8431 | 2150 | 2352 | 2472 | 0043 | 4890 | 1749 | 2030 | 7353 |
| 3488 | 9031 | 7617 | 1220 | 4129 | 7148 | 1943 | 6007 | 0641 | 2727 | 0385 |
| 9410 | 9179 | 2722 | 8445 | 8488 | 0422 | 7209 | 4950 | 1489 | 0828 | 0925 |
- d) Distinguish between sampling and non-sampling error (2mks)
- e) Discuss two sources of errors in sampling and give remedy for each (2mks)
- A simple random sampling of size 30 is taken from a population of size 100. The sample values are: 5,2,6,6,3,8,6,10,7,15,9,15,3,5,6,7,10,14,3,4,17,10,6,14,12,7,8,12,9
- What is the sampling weight for each unit in the sample (2 mks)
 - Use the sampling weights to estimate the population total (2mks)

QUESTION THREE (20 MKS)

- a) Define a simple random sampling. (2mks)
- b) Explain the two methods of selecting a simple random sampling. (4mks)
- c) What are the merits and limitations of simple random sampling (6mks)
- d) Draw all possible samples of size 2 without replacement from a population consisting of 3,8,2,5,10,12
- Form the sample distribution of the sample mean and verify the results (8mks)
- $$E(\bar{x}) = \mu \text{ and } var(\bar{x}) = \sigma^2$$

QUESTION FOUR (20 MKS)

- a) What are probability and non-probability sampling? (2mks)
- b) Distinguish between:
 - i. Target population and sample population (2mks)
 - ii. Sampling and sample design (2mks)
 - iii. Stratified and systematic random sampling techniques (2mks)
 - iv. Cluster sampling and multistage sampling (2mks)
- c) State and explain five ways on how sampling bias can be introduced. (5mks)
- d) What circumstances stratified random sampling is used. (2mks)
- e) What are the objectives of stratification? (3 mks)

QUESTION FIVE (20 MKS)

- a) Define a population (2mk)
- b) Describe four different types of population (4mks)
- c) Give illustrations of situations where systematic sampling is used. (3mks)
- d) Let the population consist of the elements 1,2,3,4 and 5. Selecting a simple random sample of size 3,
 - i. Enumerate all possible samples (2mks)
 - ii. Calculate the means of samples in (i) (4mks)
 - iii. Verify that sample mean \bar{y} is an unbiased estimate of population mean \bar{Y} (5mks)