KISII UNIVERSITY

UNIVERSITY EXAMINATION

THIRD YEAR EXAMINATION FOR THE AWARD OF THE DEGREE OF

BACHELOR OF SCIENCE IN APPLIED STATISTICS

FIRST SEMESTER 2022/2023

SEPTEMBER – DECEMBER, 2022

STAT 341: SAMPLING METHOD 1

STREAM: Y3 S1 **TIME: 2 HOURS**

DAY: **DATE:**

INSTRUCTIONS

1. ***Do not write anything on this question paper***
2. ***Answer Question ONE and any other TWO Question***

QUESTION ONE (30 MARKS)

a) Define the following terms as used in sampling [4 Marks]
   i. Sampling frame
   ii. Sampling unit
b) Calculate the sample size, if the standard deviation is 0.8 and margin of error of 10% [4 Marks]
c) Differentiate between non-probability and probability sampling techniques. [2 Marks]
d) Differentiate between census and sampling [2 Marks]
e) What are the advantages of sampling over complete enumeration [4 Marks]
f) Briefly describe the systematic sample selection procedure [4 Marks]
g) Suppose we consider simple random sampling with replacement. [6 Marks]
   show that; $var\,\bar{y} = \left(\frac{N-1}{N}\right) \times \frac{s^2}{n}$
h) Discuss giving examples for the sources of errors in survey [4 Marks]

QUESTION TWO (20 MARKS)

a) Explain two methods of selecting a simple random sample [4 Marks]
b) Define purposive sampling and state where it is applied [2 Marks]
c) Define simple random sampling [2 Marks]
d) Discuss the advantage and disadvantage stratified sampling [2 Marks]
e) Discuss five- non probability sampling techniques [5 Marks]
f) Calculate the 90% confidence interval for the survey that found that 23% of the female answered "yes", 65% said "no" and 12% of them were non-response. [3 Marks]
g) Differentiate between Proportional and Neyman allocation [2 Marks]

QUESTION THREE (20 MARKS]

a) Show that $E[\bar{y}] = \bar{Y}$ [6 Marks]
b) Show that $E[s] = S^2$ [10 Marks]
c) Discuss two properties of estimators and show how they can be calculated [4 Marks]

QUESTION FOUR (20 MARKS)

a) Explain the main steps in sample survey [10 Marks]
b) Let the population consist of the elements 1,2,3,4,5; by selecting a simple random sample of size 2,
   i. Enumerate all possible samples [2 Marks]
   ii. Calculate the means and variance of the samples (i) [4 Marks]
   iii. Verify that sample mean is an unbiased estimate of population mean [2 Marks]
c) Define an auxiliary variables [2 Marks]

QUESTION FIVE (20 MARKS)

a) Briefly describe the following types of sampling methods [6 Marks]
   i. Stratified sampling
   ii. Multistage sampling
   iii. Quota sampling

b) A random sample of 14 items is taken and found to have a mean weight of 50.25 grams and standard deviation of 10 grams.
   i. What is the mean weight of population with 95% confidence [2 Marks]
   ii. With 99% confidence [2 marks]

c) Show that; $Var(\bar{y}_{sy}) = \frac{N-1}{N}S^2 - \frac{k(n-1)}{N}S^2_{wsy}$ [5 Marks]

d) Show that; $var(\bar{y}_{sy}) = \frac{nk-1}{n^2k}[1 + (n-1)P_w] \times s^2$ [5 Marks]