



MAASAI MARA UNIVERSITY
REGULAR UNIVERSITY EXAMINATIONS
2023/ 2024 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER
SCHOOL OF PURE, APPLIED AND HEALTH
SCIENCES.
DEGREE IN APPLIED STATISTICS AND
COMPUTING.

COURSE CODE: STA 1208-1

COURSE TITLE: PRINCIPLES OF SAMPLE
SURVEY

DATE: /April/2024

TIME:

INSTRUCTIONS TO CANDIDATES

Answer Question ONE and any other TWO questions

This paper consists of FOUR printed pages. Please turn over.

QUESTION ONE

- a. Differentiate between with replacement and without replacement sampling techniques **(2 marks)**
- b. Differentiate between quota sampling and judgmental sampling **(2 marks)**
- c. Differentiate between target and sampled population. What problem arises if two populations are not the same? **(2 marks)**
- d. Distinguish between sampling and non-sampling errors. Which of these errors are more likely to be present in census or sampling survey? **(3 marks)**
- e. From the below given distribution of random of random variable X,

X	11	16	21	22	26	30	44
Probability	0.08	0.12	0.15	0.3	0.15	0.12	0.08

Find;

- i. $E(x)$ **(2 marks)**
- ii. $E(5x + 3)$ **(1 marks)**
- iii. $E(x - E(x))^2$ **(2 marks)**
- f. A without replacement random sample of $n = 130$ teachers is taken from a total of $N=1400$ teachers. Given that the estimated proportion was 0.73 and the investigator feels that the tolerable error could be taken as 0.09. Do you think the sample size of 130 is sufficient? If not, how many more units should be included in the sample? **(3 marks)**

- g. A player rolls an unbiased die. If a prime number occurs, he wins an equal number of dollars. Showing up of a nonprime number results in loss of that number of dollars to him. Is the game favorable to the player? **(3 marks)**

QUESTION TWO

- a. Discuss three principles that should be kept in mind, while going for stratified sampling **(3 marks)**
- b. The number of colleges in 12 districts of a state are 8, 10, 6, 4, 7, 9, 13, 5, 12, 8, 9 and 11. List all possible samples of size 3 that can be selected from this population of 12 units using;
- i. Linear systematic sampling (LS) and determine the average of the corresponding means **(4 marks)**
 - ii. Circular systematic sampling (CS) and determine the average of the corresponding means **(4 marks)**
 - iii. Are these sample means equal to population mean? **(1 mark)**
- c. State the three commonly used methods of using random number tables for selection of simple random samples **(3 marks)**

QUESTION THREE

- a. Explain the need for sample **(4 marks)**
- b. The owner of a poultry farm is interested in estimating the total gain in a period of one month, for $N = 1600$ chicks kept on new food. For this purpose, a simple random WR samples of $n_1 = 30$ chicks is observed for weight gain. The sample data yielded

$s_1^2 = 60 \text{ gm}^2$. Determine the sample size required to estimate total weight gain with 2.4 kg as margin of error. **(4 marks)**

c. How does stratification increase efficiency of the estimator of mean/total and proportion? **(3 marks)**

d. Do you think it is appropriate to use stratified sampling to estimate:

- i. Average calories taken per day by boys and girls,
- ii. Proportion of nonexistent voters in a voters list,
- iii. Per day travelling allowance of teaching and non-teaching staffs of a university, and
- iv. Mean weight of adult men and women in a city. **(4 marks)**

QUESTION FOUR

a. A population consists of 4 statistics lecturers having teaching load of 35, 42, 39 and 37 credit hours in a semester.

- i. List all possible with replacement simple random samples of size 2 and find their means **(3 marks)**
- ii. Show that; $E(\bar{y}) = \bar{Y}$ **(4 marks)**
- iii. $V(\bar{y}) = \frac{\sigma^2}{n}$ **(4 marks)**
- iv. $E(s^2) = \sigma^2$ **(4 marks)**