DBZ-003-1172004   Seat No. _____

M. Sc. (Sem. II) Examination

July - 2022

Sampling Techniques : MS-204

Faculty Code : 003

Subject Code : 1172004

Time : $2\frac{1}{2}$ Hours]   [Total Marks : **70**

1   Answer the following questions : (Any **Seven**)   **14**

(1)   What is meant by cluster sampling ?

(2)   Define single stage cluster sampling.

(3)   Define multi stage cluster sampling with an example.

(4)   Define systematic sampling with an example.

(5)   How is a linear systematic sample selected ?

(6)   How is a circular systematic sample selected ?

(7)   How do cluster and systematic sampling differ ?

(8)   What is PPS sampling ? Give an example ?

(9)   In what situation sampling is inevitable ?

2   Answer the following questions : (Any **Two**)   **14**

(1)   Let the five number 3, 4, 5, 6, 7 constitute a population. Select all samples of size three without repetition. Compute their means. Compare the sample means with the mean of the population. And decide the statistic is unbiased or biased.

(2) A population consist the four members 3, 7, 11, 15. Consider all possible samples of size two which can be drawn with replacement from this population. Determine whether according to their statistic (mean), is unbiased or biased. Also find the variance and standard deviation of the sample using estimator E.

(3) Prove that in simple random sampling without replacement.

3 Answer the following questions :   **14**

(1) In SRSWR, the selection of up to "n" units (one by one), can be done in N^n ways. Where n= Sample size and N = Population size.

(2) The sample mean $\bar{y}$ is an unbiased estimator of population mean $\bar{Y}$ in both the cases (i) SRSWR and (ii) SRSWOR.

OR

3 Answer the following questions :   **14**

(1) Why the population is considered to be divided into different strata or layers ?

(2) A small company has 1,000 employees and they want to save money for retirement. The data of employees according to their ages as given below :

Age	20 – 30	30 – 40	40 – 50	50 – 60	60 +
Total No. of Employee	160	220	240	200	180

Also, the data having value of standard deviation 10, error is -2.77 with 95% confidence level. Use stratified random sampling to obtain the sample.

4 Answer the following questions : (Any **Two**)   **14**

(1) Write a short note on characteristics of good sample.

(2) Explain the probability sampling and non-probability sampling in detail.

(3) Mention in brief the method of simple random sampling (SRS).

5 Answer the following questions : (Any **Two**)   **14**

(1) The building has ten rooms, each room has 4 residents. Find out the resident age $\left(\overline{y}_i\right)$, Mean of age $\left(\overline{\overline{y}}_i\right)$ at 95% of confidence level and difference $\left(s_b^2\right)$ of this sampling. Choose 3 rooms with SRS, the result is as below :

	Room 1	Room 2	Room 3
Re *sident* 1	23	22	21
Re *sident* 2	24	24	24
Re *sident* 3	25	25	25
Re *sident* 4	26	27	28

(2) Explain Lahiri's method in detail.

(3) What are the types of systematic sampling ? Explain in detail.

(4) A simple random sample of n clusters is drawn from a population of N clusters each cluster containing M units then show that

(i) Sample mean per cluster is an unbiased estimator of population mean per cluster. i.e. $E\left(\overline{y}_1\right) = \overline{Y}_1$.

(ii) Sample mean per element is an unbiased estimator of population mean per element i.e. $E\left(\overline{\overline{Y}}_1\right) = \overline{\overline{Y}}$.

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