16P254

(Pages: 2)

Name...................

Reg. No...................

SECOND SEMESTER M.Sc. DEGREE EXAMINATION, MAY-2017
(Regular/Supplementary/Improvement)

(CUCSS - PG)

CC15P ST2 C07 - SAMPLING THEORY
(Statistics)

(2015 Admission)

Time: Three Hours

Maximum: 36 Weightage

PART A
(Answer all questions. Weightage 1 for each question)

1. State any four situations where sampling is inevitable.
2. What is finite population correction and sampling fraction?
3. Write any four factors responsible for the size of a sample.
4. Show that in simple random sampling with replacement the sample mean is unbiased for the population mean.
5. Give any two disadvantages of systematic sampling.
6. Mention any four advantages of stratified sampling.
7. Explain the proportional allocation in the stratified sampling.
8. Explain cumulative total method of PPS selection.
9. Define Desraj ordered estimator for the population total.
10. What do you mean by cluster sampling?
11. Explain the bias and relative bias of a ratio estimator.
12. Explain multi-phase sampling.

(12x1=12 weightage)

PART B
(Answer any *eight* questions. Weightage 2 for each question)

13. For an SRSWOR with population size N and sample size n, show that the probability of a specified unit being selected at any given draw is $\frac{1}{N}$.

14. A random sample of size n with mean $\bar{y}$ is drawn from a population. A sub sample of size n_1 with mean $\bar{y}_1$ is drawn from this sample. Let $\bar{y}_2$ be the mean of the remaining $(n - n_1)$ units in the sample. Show that $Cov(\bar{y}, \bar{y} - \bar{y}_1) = 0$.

15. Suggest an unbiased estimator for the population proportion under simple random sampling without replacement and derive its variance and also obtain an estimator for the variance.

16. Derive the variance of conventional estimator for the population mean under circular systematic sampling assuming the presence of linear trend.

17. Give an unbiased estimator of population mean square based on a stratified random sample. Hence find an estimate of relative gain in precision due to stratification.

1

18. Find an unbiased estimator of population mean square based on cluster sampling where clusters are of equal size. Hence estimate the relative gain in efficiency of cluster sampling.
19. Carry out a comparison between ratio and regression estimators of population mean
20. Discuss separate regression estimator and combined regression estimator.
21. Derive Yates Grundy form of estimated variance of Horvitz-Thompson estimator of population mean.
22. Explain double sampling and elaborate its application in ratio method of estimation.
23. Explain Murthy's unordered estimator and its properties.
24. In two-stage sampling with equal first stage units, show that mean of the first stage unit means in the sample is an unbiased estimator of population mean. Also derive an estimate of its variance.

(8x2=16 weightage)

PART C
(Answer *two* questions. Weightage 4 for each questions)

25. (a) Explain probability sampling and non-probability sampling.
    (b) Show that sample mean is the BLUE of population mean in SRSWOR.

26. Let V_{ran}, V_{prop} and V_{opt} be the variances of the usual estimators under simple random sampling, proportional allocation and optimum allocation for a given sample size. If N is large then show that $V_{opt} \leq V_{prop} \leq V_{ran}$.

27. (a) Stating the regularity conditions establish the optimum property of ratio estimator.
    (b) What do you mean by a difference estimator? Show that it is unbiased. Find its variance.

28. (a) What do you mean by (i) single start linear systematic sampling (ii) circular systematic sampling and (iii) multiple start systematic sampling.
    (b) What do you mean by two stage sampling? Obtain an unbiased estimator of population mean in two stage sampling

(2x4=8 weightage)

****