

F-57/2110

10323/NJ

SAMPLE SURVEYS

CSM- 355

PART-III (Semester-Vth)

(Syll-Dec-2019)

Time Allowed: 2 Hours

Maximum Marks: 30

Note: The candidates are required to attempt any four questions from all. Each question carry equal marks.

1. (a) What do you understand by census and sample survey? Justify the need for sampling rather than the causes. With examples.

(b) Show that in simple random sampling without replacement the probability of selecting a specified unit of the population at any draw is equal to the probability of selecting it at the Ist draw.
2. (a) Show that in simple random sampling without replacement (srswor).
$$E(s^2) = S^2$$

(b) How will you obtain a simple random sample of size 5 from a population of 40 units by using lottery method? Explain.
3. (a) Describe in detail the Sampling Error and Non Sampling Error with examples. How these can be reduced?

(b) Show that if a random sample of size n is drawn without replacement from a finite population of size N with mean Y_N and variance σ^2 ; the covariance between any two numbers of the sample is $\left(-\frac{S^2}{N}\right)$, where S is the population mean square.
4. (a) Define simple random sampling of attributes with examples and prove that in SRSWOR of attributes
$$V(P) = \frac{N-n}{N-1} \frac{PQ}{n}$$
, where symbols have their usual meaning.

(b) Describe the random number table method of selecting a sample. Outline the different random number series.
5. (a) What is stratified random sampling with example? Point out a situation suitable for the use of stratified random sampling. Describe proportional method of allocation of sample size in different strata.

- (b) Why stratified random sampling without replacement sample mean \bar{y}_{st} is an unbiased estimator of population mean \bar{y}_N , but not the simple sample mean.
6. (a) Show that in simple random sampling the large sample variance of the regression estimator is given by $V(\bar{y}_{st}) = \frac{1-f}{n} S_y^2 (1 - \rho^2)$.
 (b) Define ratio estimator with example. Derive the ratio estimator for population Total.
7. (a) Prove that the regression estimator is always more efficient as compare to ratio estimator and mean per unit estimator under simple random sample without replacement for estimating the population mean.
 (b) Define the term regression estimator with example. Also obtain estimator of population mean.
8. (a) What is optimum allocation? Use this allocation to prove

$$V_{min}(\bar{y}_{st}) = \frac{(\sum W_h S_h)^2}{n} - \frac{\sum W_h S_h^2}{N}$$
 (b) Define stratified proportional sampling in your words with example and find the variance of it.
9. (a) Explain the principle of sampling.
 (b) Prove that sample proportion p is an unbiased estimate of population proportion P.
 (c) Define statistics and sampling distribution of a statistic.
 (d) Describe the Lottery method.
 (e) Discuss the bias of ratio estimator.
 (f) What common assumptions are made to obtain the approximate variances of ratio estimator and regression estimator?
 (g) Prove that ratio estimator method gives more precise result whenever $\rho > \frac{C.V.(x)}{2C.V.(y)}$ where ρ is correlation between x and y C.V. is coefficient of correlation?

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