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3 SEM TDC STSH (CBCS) C 6

2021

(Held in January/February, 2022)

STATISTICS

(Core)

Paper : C-6

(Survey Sampling and Indian Official Statistics)

Full Marks : 50

Pass Marks : 20

Time : 2 hours

*The figures in the margin indicate full marks
for the questions*

1. Choose the correct answer from the following
alternatives in each question : 1×5=5

(a) A population consisting of an unlimited
number of units is called

(i) a finite population

(ii) a statistical population

(iii) an infinite population

(iv) None of the above

- (b) The standard deviation of all possible estimates from samples of finite sample size is called
- (i) coefficient of variation
 - (ii) precision
 - (iii) standard error
 - (iv) None of the above
- (c) Determination of sample size for each stratum subject to the cost constraint is known as
- (i) proportional allocation
 - (ii) Neymann allocation
 - (iii) Both (i) and (ii)
 - (iv) None of the above
- (d) Efficiency of cluster sampling increases as the cluster sizes
- (i) remain same
 - (ii) decrease
 - (iii) increase
 - (iv) None of the above
- (e) In ratio method of estimation
- (i) the relation between y_i and x_i is a straight line through the origin
 - (ii) the relation between y_i and x_i is a straight line through any point
 - (iii) the relation between y_i and x_i is non-linear
 - (iv) None of the above

2. Answer the following in brief : $2 \times 5 = 10$

- (a) What do you mean by sampling frame?
- (b) State the circumstances when systematic sampling is optimum.
- (c) Describe the technique of drawing a stratified random sample.
- (d) Name two Government of India's principal publications containing statistical data on various factors of population.
- (e) What are the main differences between cluster sampling and stratified random sampling?

3. (a) What are the different sources of errors in a sample survey? Describe briefly how these errors can be controlled.

$5+5=10$

Or

- (b) How does sampling without replacement differ from sampling with replacement? Which of them gives a lower value of the standard deviation of the sample mean? Explain by considering samples of size two from a population consisting of the four observations 2, 3, 6, 8.

$3+2+5=10$

4. (a) What is stratified random sampling? Describe the methods used to fix the number of units to be selected from each stratum. Obtain $V(\bar{y}_{st})$ and also obtain the result for the particular cases when—

(i) n_h / N_h is negligible;

$$(ii) n_h = \frac{nN_h}{N}.$$

$$2+3+3+1+1=10$$

Or

- (b) Define systematic sampling. Discuss its advantages and disadvantages. Prove that the systematic sampling is more precise than the simple random sampling, if the variance within the systematic sampling is larger than the population variance as a whole. $2+3+5=10$

5. (a) What do you mean by ratio estimate? With usual notations, derive the approximate variance of the ratio estimate \hat{R} and \hat{Y}_R .

$$2+5+2=9$$

Or

- (b) What is cluster sampling? Suppose n clusters of M elementary units each are selected by SRSWOR. Let b and w be the unbiased estimates between clusters

and within cluster variances respectively. Obtain an unbiased estimate of the relative efficiency of cluster sampling with respect to simple random sampling of nM elementary units by estimating the sampling variances in the two cases unbiasedly.

2+7=9

6. (a) What is NSSO? What types of survey are conducted by NSSO? Write about two special features of NSSO. 6

Or

- (b) What is CSO and in what purpose CSO was setting up? Write an explanatory note on activities of CSO. 6
