

B.Sc. Sem-6 Examination

CC 308

Statistics

Time : 2-00 Hours]

October 2021

[Max. Marks : 50

Instructions

1. There are two sections in this question paper.
2. All questions in Section – I carry equal marks.
3. Attempt ANY THREE questions from Section – I.
4. Section – II is compulsory.
5. Figures to the right indicate full marks of the questions/sub-questions.

SECTION - I

- Q. 1 a Define terms: *population and its type, sample, sample survey and census*. State the advantages of sample survey. 07
- b Write a note on Simple Random Sampling. 07
- Q. 2 a In usual notations, prove for the simple random sampling under without replacement, $E(\bar{y}) = \bar{Y}$, Also, obtain its variance. 07
- b In usual notations, for simple random sampling, show that sample proportion is unbiased for population proportion. 07
- Q. 3 a Describe *stratification and stratified sampling*. With reference to *stratified sampling*, in usual notations, prove that stratified mean is an unbiased estimate of population mean. 07
- b In usual notations, prove $V(\bar{y}_{st})_{opt} \leq V(\bar{y}_{st})_{prop}$. 07
- Q. 4 a State different allocations used in *stratified sampling*. Explain, in detail, *Neyman allocation*. 07
- b In usual notations, show that $E(v(\bar{y}_{st})) = V(\bar{y}_{st})$ 07
- Q. 5 a In usual notations, prove that if $N = nk$, $V(\bar{y}_{sy}) = \frac{N-1}{N} S^2 - \frac{N-k}{N} S_{wsy}^2$ 07
- b If ρ_w is the coefficient of correlation between the units of the same systematic sample, then prove that $V(\bar{y}_{sy}) = \frac{N-1}{Nn} S^2 (1 + (n-1)\rho_w)$ 07
- Q. 6 a In usual notations, prove that if $N = nk$, $E(\bar{y}_{sy}) = \bar{Y}$ and find $V(\bar{y}_{sy})$ 07
- b Write a note on systematic sampling. Also, state its merits and demerits. 07
- Q. 7 a Give brief idea about *Two Stage Sampling*. Do you suggest it as an incomplete stratification? 07
- b *How does two stage sampling differ from cluster sampling?* 07
- Q. 8 a In usual notation for *two stage sampling* show that 07
- $$V(\bar{y}) = (1 - f_1) \frac{S_1^2}{n} + (1 - f_2) \frac{S_2^2}{mn}$$
- b For *Two Stage Sampling*, derive the formula for unbiased estimator of $V(\bar{y})$. 07

SECTION – II

- Q. 9 Answer the following: 08
- i) Give one example of hypothetical population.
 - ii) State the variance of proportion, in case of Simple Random Sampling.

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- iii) In Stratified Sampling, which sampling scheme is adopted for drawing random sample from strata?
- iv) State the role of stratum standard deviation in allocation of sample sizes.
- v) In systematic sampling, state the appropriate relationship between S^2 and S_{wsy}^2 .
- vi) State one disadvantage of Systematic Sampling.
- vii) What are primary and secondary units?
- viii) Give one application of Two Stage Sampling.

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