



Register Number:

DATE:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

B.Sc. STATISTICS - V SEMESTER

SEMESTER EXAMINATION - OCTOBER 2019

ST: 5117 – SAMPLING THEORY AND DESIGN OF EXPERIMENTS

Time: 2½ hrs

Max: 70 Marks

This question paper has **TWO** printed pages and **THREE** parts

SECTION – A

I Answer any FIVE of the following:

5 x 3 = 15

1. Distinguish between simple random sampling with and without replacement
2. Systematic sampling is a particular case of stratified sampling. Justify
3. Write a note on equal allocation with reference to stratified random sampling
4. Give any three assumptions of one way classification model
5. Define following with examples (i) Yield (ii) Block (iii) Treatment
6. i) In SRSWOR and SRSWR, equality of both variances occurs when
(a) $n = 1$ (b) $n = 2$ (c) $n \neq 1$ (d) $n > 2$
ii) The cluster sampling is more efficient if
(a) Within cluster variation is less (b) Within cluster variation is more
(c) Between cluster variation is more (d) None of the above
iii) In cluster sampling, after selecting clusters, further sampling is done in each cluster.
State True or False
7. i) In a Latin Square design, numbers of rows, columns, and treatments are
(a) All different (b) Not necessarily equal (c) Always equal (d) None
ii) In 2^2 factorial experiment with two treatments A and B. The symbol **a** stands for
(a) A and B both at higher level (b) A at higher level and B at lower level
(c) A and B both at lower level (d) A at lower level and B at higher level
iii) When the same interaction is confounded in all the replicates, it is called partial confounding. True / False

SECTION – B

II Answer any FIVE of the following:

5 x 7 = 35

8. A) Explain the procedure of selecting simple random sampling using random number table
B) Give the an expression for $100(1 - \alpha)\%$ confidence interval for population mean under simple random sampling with replacement (5+2)
9. A) Derive the expression for strata sample size under Neymann allocation.
B) Derive the expression for cluster mean when clusters are selected from SRSWOR and clusters with equal size. (4+3)
10. A) Briefly explain the Least Significant Difference along with limitations
B) Why 2X2 Latin square is not used? (5+2)
11. A) How Stratified random Sampling is different from Cluster sampling (3+4)
B) Give the ANOVA table for two way classified data with m number of observations per cell
12. Outline analysis of one way classified data. (7)
13. A) Explain Yates method of computing factorial effect in 2^3 factorial experiments.
B) Define factorial experiments. Explain the terms (i) Main effects (ii) Interaction effects. (4+3)
14. A) Describe the procedure of analyzing a Latin Square Design when single observation is missing.
B) What do you understand by uniformity trial? (5+2)

SECTION – C

III Answer any TWO of the following:

2 x 10 = 20

15. A) Explain the procedure of selection of systematic sample with an example. Derive an unbiased estimator of population mean under the systematic sampling scheme
B) Distinguish between
i) Population & Sample ii) Census & Sampling survey (6+4)
16. A) Describe the principles of design of experiments.
B) What is meant by confounding in an experiment? Explain the term complete confounding. (6+4)
17. A) Give the ANOVA table for 2^2 factorial experiments in r randomized blocks.
B) Show that optimal allocation is better sampling scheme than proportional allocation and Simple Random sampling (3+7)