

Tribhuvan University  
Institute of Science and Technology  
2068



Bachelor Level/ First Year/ Second Semester/ Science

**Computer Science and Information Technology (STA. 159)**

(Stat - II)

*Candidates are required to give their answers in their own words as far as practicable.*

The figures in the margin indicate full marks.

Full Marks: 60

Pass Marks: 24

Time: 3 hours

**All notation have usual meanings.**

**Group A**

**Answer any two questions**

(2 x 10 = 20)

1. Under which situation probability proportion to size (pps) sampling is an appropriate method for drawing a random sample. Explain the procedure of drawing a random sample in pps sampling plan. In pps sampling with replacement, derive an unbiased estimator of the parameter  $Y$ , population total and also derive the variance of the estimator.
2. What do you mean by factorial design? Discuss its role in design of experiment. Obtain main effect and interaction effect in  $2^2$  factorial design.
3.
  - a) What do you mean by ANOVA? Explain the underlying assumptions of ANOVA.
  - b) Explain the term-sampling error and non-sampling error.

**Group B**

**Answer any eight questions**

(8 x 5 = 40)

4. Suppose it is required to estimate the average value of output of a group of 5000 factories in an industrial area so that one sample estimate lies within 10% of the true value with a confidence of 95%. Determine the minimum sample size required. It is also known that the population coefficient of variation is 60%.
5. Derive the expression of the sample mean in case of cluster sampling, each cluster containing equal number of element.
6. The following table summarizes population size ( $N_h$ ) and population variance ( $S_h^2$ ) of four strata. Calculate the variance of the stratified estimator  $\bar{y}_{st}$  of the population mean for proportional allocation of a total sample size 100.

|         |       |      |      |      |
|---------|-------|------|------|------|
| h       | 1     | 2    | 3    | 4    |
| $N_h$   | 14000 | 3000 | 1500 | 1500 |
| $S_h^2$ | 34    | 94   | 175  | 319  |

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