This question paper contains **4** printed pages]

Roll No. ☐☐☐☐☐☐☐☐☐

S. No. of Question Paper : **5452**

Unique Paper Code : **237651**   **D**

Name of the Paper : **Sample Survey & Design of Experiments**

Name of the Course : **B.A. (Programme) Statistics—Discipline Course**

Semester : **VI**

Duration : **3 Hours**   Maximum Marks : **75**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt *Five* questions in all, selecting *two* from

Sections A and B each and *one* from Section C.

Use of simple calculators is allowed.

Section A

1. (*a*) What are the principal steps in the conduct of sample a survey ? Discuss them briefly.   5

    (*b*) The following table gives ten random numbers each of two digits :

         34   96   61   85   49   78   50   02   27   13

    Obtain the serial numbers of 5 plots to be selected out of 40 plots without replacement.

(c) Prove that in srswor, the variance of the sample mean is given by :

$$\text{Var}(\bar{y}_n) = \left(\frac{1}{n} - \frac{1}{N}\right)S^2,$$

the notations have their usual meaning.   7

2. (a) Describe the methods of allocating a sample to different strata. Obtain the variance of the estimate of the population mean under each allocation and compare them. Also compare them with simple random sampling.   8

(b) In a finite population of size N, show that the systematic sampling will be more efficient than srswor if the intra-class correlation coefficient :   8

$$\rho = -\frac{1}{(N-1)}.$$

3. (a) Define ratio estimator. Derive an expression for its bias to the first approximation and show that it vanishes when the regression of y on x is a straight line passing through origin.   8

(b) Prove that the relative efficiency of cluster sampling to simple random sampling increases as the mean square within the clusters increases.   8

Section B

(a) What are uniformity trials ? Discuss their utility in determining the shape and size of blocks and plots.   8

(b) For a one-way classified data :

    (i) Partition the total variation of various components, and

    (ii) Obtain the expectations of the various sum of squares.   8

5. (a) Estimate a missing value in an RBD. Calculate the standard error of the difference between two treatment means, one of which involves the missing plot.   7

    (b) Derive the analysis of covariance for CRD with one concomitant variable.   9

6. (a) In two-way classification with one observations per cell, show that the mean square error provides an unbiased estimate of error variance.   5

    (b) What is Experimental error ? How does the use of local control help in minimizing experimental error in design of agricultural experiments ?   5

    (c) The following table gives the results of the Latin Square Experiment on the effects of the four manurial treatments on the yield of the sugarcane. Test whether the treatments are equally effective. If not, compare A and B.   6

A	C	B	D
12	19	10	8
C	B	D	A
18	12	6	7
B	D	A	C
22	10	5	21
D	A	C	B
12	7	27	17

Section C

7. (a) State the difference between the de-jure and de-facto methods of conducting a census of population.   5

    (b) How are Agricultural Statistics of area and yield collected in India ? Describe *two* common defects in Indian Agricultural Statistics.   6

8. (a) Discuss the nature, scope and limitation of the Trade Statistics in India.   6

    (b) Describe in brief the functions of the NSSO and name any *five* of its publications.   5