U.G. 6th Semester Examination - 2021

STATISTICS

[HONOURS]

Course Code : STAT-H-CC-T-13

(Design of Experiments)

Full Marks : 50(40+10) Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.

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

Notations and symbols have their usual meanings.

1. Answer any **five** of the following questions: 2×5=10
   a) What do you mean by a residual BIBD?
   b) "Latin square design is an incomplete 3-way layout."—Explain.
   c) When a block design is called variance-balanced?
   d) Write down the incidence matrix of a randomized block design.
   e) What are the basic objectives of replication in Design of Experiment?
   f) Mention the basic difference between designs of experiment and designs of sample survey.
   g) What are the advantages of RBD over CRD?
   h) When two treatment combinations are called aliases of one another?
2. Answer any **two** of the following questions: 5×2=10
   a) Explain the role of local control in Design of Experiments.
   b) For a block design, prove that $E(\underline{Q}) = C\tau$.
   c) If in an RBD with 4 blocks and 5 treatments, the mean square due to blocks is 4 times that due to error, find the relative efficiency of the design compared to a CRD.
   d) Discuss Yates' method of determining the factorial effect totals in a 2^3 factorial experiment. How can you use the factorial effect totals to calculate the sum of squares due to main effects and interaction effects?
3. Answer any **two** of the following questions:10×2=20
   a) i) For a BIBD with parameters (v,b,r,k,λ), if b is divisible by *r*, prove that $b \geq v + r - 1$.
      ii) State and prove a necessary and sufficient condition for a connected block design to be orthogonal. 5+5
   b) What are the structural definition and the rank definitions of connectedness of a block design? Prove that these two are equivalent. 3+7

c) How will you estimate the yield of a missing plot in LSD? Discuss in detail how will you carry out the analysis of LSD after estimating the yield of missing plot. 4+6

d) Differentiate between total and partial confounding in factorial experiments. Give the layout of a $(2^3, 2)$ experiment in 4 replicates where each main effect is unconfounded but each interaction effect is partially confounded. 4+6

[*Internal Assessment : 10*]

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