5/H–28 (vi) (Syllabus–2015)

2 0 2 2

(November)

STATISTICS

(Honours)

[STEH–52 (TH)]

(Linear Models, Regression and Operations Research, Design of Experiments)

Marks : 56

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, taking **one** from each Unit

UNIT—I

1. *(a)* State and prove Gauss-Markov theorem in the context of linear models.

   (b) State and prove necessary and sufficient condition for a parametric function to be estimable.

   (c) Define best linear unbiased estimator (BLUE).   6+4+2=12

2. *(a)* State some properties of least square estimator of the parameters in simple linear regression model.

(b) State the problem of linear estimation in Markov setup.

(c) Explain the term estimable parametric function. $5+3+4=12$

UNIT—II

3. Obtain the formula to express the multiple correlation coefficient in terms of the total correlation coefficients between the pairs of variable, i.e.,

$$R^2_{1.23} = 1 - \frac{w}{w_{11}}$$

$$= \frac{r^2_{12} + r^2_{13} - 2r_{12}r_{13}r_{23}}{1 - r^2_{23}}$$

11

4. *(a)* What are the consequences in regression analysis, if the assumption of normality is violated?

(b) Define homoscedasticity and multi-collinearity.

(c) How can one test the overall adequacy of multiple linear regression model? $4+4+3=11$

UNIT—III

5. *(a)* What is meant by confounding in a factorial experiment? Why is confounding used even at the cost of loss of information on the confounded effects? Explain the terms complete confounding and partial confounding.

(b) Write a note on factorial experiment. $8+3=11$

6. *(a)* Give in detail the analysis of partially confounded 2^3-experiment.

(b) Give in detail the analysis of 3^2-experiment in randomized blocks. $6+5=11$

UNIT—IV

7. *(a)* What are the essential characteristics of a linear programming problem?

(b) Explain the graphical method of solving an LPP involving two variables. $4+7=11$

8. *(a)* Define slack and surplus variable in LPP.

(b) State the general LPP.

(c) Write notes on :

(i) Optimum solution

(ii) Feasible solution $4+3+4=11$

(**4**)

9. *(a)* Explain transportation problem with application.

   (b) Explain North-West Corner method to solve transportation problem for an initial solution. 5+6=11

10. *(a)* Describe Vogel's approximation method to obtain a basic feasible solution.

   (b) Write a note on assignment problem.

6+5=11

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