

5/H-28 (vi) (Syllabus-2015)

2018

(October)

STATISTICS

(Honours)

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

[STH-52 (TH)]

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

12

1. Explain the following :

- (a) Estimable parametric function
- (b) Error function
- (c) Best linear unbiased estimator
- (d) Gauss-Markov linear model

(Turn Over)

19/110

(2)

2. (a) Consider three independent variables y_1, y_2 and y_3 having common variance σ^2 and expectation $E(y_1) = \mu_1 + \mu_2$, $E(y_2) = \mu_1 + \mu_2$ and $E(y_3) = \mu_1 + \mu_3$. Determine the condition of estimability of the parametric function $l'\mu = l_1\mu_1 + l_2\mu_2 + l_3\mu_3$.

- (b) In the case of Gauss-Markov linear model

$$E(y) = A\beta \text{ and } D(y) = \sigma^2 I$$

obtain least squares estimators of the parameter vector, where $D(y)$ stands for the dispersion matrix, I , the identity matrix of order n .

12

UNIT—II

3. (a) Give an idea of multiple regression.
(b) The equation of the plane of regression of X_1 on X_2 and X_3 is given by $X_1 = b_{12.3}X_2 + b_{13.2}X_3$, where $b_{12.3}$ and $b_{13.2}$ are regression coefficients. Estimate these regression coefficients by the principle of least squares method.

11

11

4. Write notes on the following :

- (a) Correlation ratio
(b) Correlation index
(c) Violation of usual assumptions concerning normality and co-linearity

D9/110

(Continued)

(3)

UNIT—III

5. Give the complete analysis of a two-way classified data with m observations per cell under fixed effect model. Write the assumptions to be used, hypotheses to be tested, test statistic to be used along with ANOVA table.

11

6. (a) What do you mean by factorial experiment in design of experiment? Write down the main effects and interaction effects in a 2^3 -factorial experiment.

- (b) Write a note on confounding in a 2^3 -experiment.

11

UNIT—IV

7. (a) What is a linear programming problem?
(b) Define the following :

- (i) General linear programming problem
(ii) Feasible solution, basic solution and basic feasible solution

- (c) Write all the assumptions of a linear programming problem.

1+3+3+4=11
(Turn Over)

D9/110

(4)

8. (a) Write different steps to formulate a linear programming problem.

(b) Write the algorithm to solve a linear programming problem by graphical method.

6+5=11

UNIT—V

9. What do you mean by transportation problem? Write different steps to solve transportation problem by (a) north-west corner rule and (b) matrix minima method or by Vogel's approximation method.

5+3+3=11

10. Write the algorithm of an assignment problem by using Hungarian method.

11
