UG/5th Sem/STAT(H)/Pr/19

2019

B.Sc. (Honours)

5th Semester Examination

STATISTICS

Paper - C 12-P

Linear Models

Full Marks : 20 Time : 3 Hours

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer *all* questions

1. Consider the following linear model.

$$y_1 = \mu + \alpha_1 + \beta_1 + \varepsilon_1$$

$$y_2 = \mu + \alpha_1 + \beta_2 + \varepsilon_2$$

$$y_3 = \mu + \alpha_2 + \beta_1 + \varepsilon_3$$

$$y_4 = \mu + \alpha_2 + \beta_2 + \varepsilon_4$$

[Turn Over]

$y_5 = \mu + \alpha_3 + \beta_1 + \varepsilon_5$

$y_6 = \mu + \alpha_3 + \beta_2 + \varepsilon_6$

(i) When is

$\lambda_0\mu + \lambda_1\alpha_1 + \lambda_2\alpha_2 + \lambda_3\alpha_3 + \lambda_4\beta_1 + \lambda_5\beta_2$ estimable ? (2)

(ii) Is $(\alpha_1 + \alpha_2)$ estimable ? (2)

(iii) Obtain the BLUE of $(\beta_1 - \beta_2)$ if it is estimable. (2)

(iv) Obtain any linear function of observations belonging to the error space. (2)

2. A trucking company wishes to test the average life of each of the four brands of tyres. The company uses all brands on randomly selected trucks. The lives (thousands of miles) of tyres are shown in the table given below :

Brand 1	Brand 2	Brand 3	Brand 4
20	15	19	15
23	19	20	17
17	17	21	18
18	20	16	16
	16	17	

Check whether there is any significant difference between the average lives of the four brands of tyres. (7)

3. Laboratory Note Book. (2)

4. Viva-voce. (3)
