2021

STATISTICS — HONOURS — PRACTICAL

Paper : CC-12P

Full Marks : 30

The figures in the margin indicate full marks.

Answer *all* questions.

1. Let there be independent variables x_1, x_2, x_3 and the dependent variable y. The coded values of the independent variables and the corresponding observations are given in the following table :   15

x_1	x_2	x_3	y
−1	−1	−1	161
1	−1	−1	183
−1	1	−1	151
1	1	−1	170
−1	−1	1	166
1	−1	1	192
−1	1	1	156
1	1	1	183

(a) Fit a linear regression

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 \text{ of } y \text{ on } x_1, x_2 \text{ and } x_3$$

(b) Test the hypothesis $H_0 : \beta_2 = \beta_3$ against $\beta_2 \neq \beta_3$

(c) Verify that $SS_{Reg} = SS_{\hat{\beta}_1} + SS_{\hat{\beta}_2} + SS_{\hat{\beta}_3}$

where SS_{Reg} = sum of squares due to regression

        $SS_{\hat{\beta}_i}$ = sum of squares due to $\hat{\beta}_i$; $i = 1, 2, 3$

Please Turn Over

2. In a feeding trial 16 cows were all fed on the same ration for a control period of three weeks, and then for a further period of six weeks on four different diet plans. The cows were divided into four groups on the basis of age. The average weekly milk yields in pound for the control period (x) and the experimental period (y) are given below : 15

Groups

Diet plans	A		B		C		D	
	x	y	x	y	x	y	x	y
Diet plan I	279	208	245	212	197	157	250	208
Diet plan II	223	172	224	164	179	156	232	166
Diet plan III	269	183	256	204	191	136	311	192
Diet plan IV	342	247	208	150	210	159	274	210

Analyse the data to test whether there is any significant difference in the effectiveness of the diet plans.