

B.Sc. 5th Semester (Honours) Examination, 2020 (CBCS)
Subject: Statistics
Paper: CC-12
(Linear Models)

Time: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

Candidates are requested to give their answers in their own words.

The notations and symbols have their usual meanings.

Answer any **eight** from the following:

8×5=40

1. What do you mean by an estimable parametric function? State a necessary result to examine a parametric function to be estimable.
2. Define contrast of treatment effects. Define $L_1 = \frac{\beta_1}{\sqrt{n}} + \frac{\beta_2}{\sqrt{n}} + \frac{\beta_3}{\sqrt{n}}$, $L_2 = \frac{\beta_1}{\sqrt{2}} - \frac{\beta_2}{\sqrt{2}}$ and $L_3 = \frac{\beta_1}{\sqrt{6}} + \frac{\beta_2}{\sqrt{6}} - \frac{2\beta_3}{\sqrt{6}}$, where β_i 's are treatment effect. Check $\{L_1, L_2, L_3\}$ are mutually orthogonal treatment contrast or not.
3. Describe one way ANOVA random effects model with proper assumptions.
4. What is adjusted R^2 ? Discuss the role of this criterion in case of model checking.
5. Let Y_1 and Y_2 be two regression equations with slopes b_1 and b_2 . Test two regression lines are parallel or not.
6. State and prove Gauss-Markov theorem.
7. In case of multiple regression model with k predictors test $H : b_1 = b_2 = \dots = b_k = 0$ against $K : b_i \neq 0$ for at least one $i = 1(1)k$.
8. Define valid error, and discuss it for some ANOVA models?
9. What is multicollinearity in a regression model? How can it be identified? Discuss its effects.
10. Write a short note on the applications of ANOVA.