**2022/TDC(CBCS)/EVEN/SEM/
STSHCC–402T/127**

TDC (CBCS) Even Semester Exam., 2022

STATISTICS

(Honours)

(4th Semester)

Course No. : STSHCC–402T

(Linear Method)

Full Marks : 50

Pass Marks : 20

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

SECTION—A

Answer any *ten* questions :   2×10=20

1. Define linear estimation with an example.

2. What do you understand by analysis of covariance?

3. Why are there two lines of regression?

(2)

4. What do you mean by contrast?

5. Distinguish between fixed effect model and random effect model in analysis of variance.

6. Define best linear unbiased estimator (BLUE).

7. What do you mean by $H_0 : \beta_1 = 0$ in $Y = \beta_0 + \beta_1 X + \varepsilon$, where symbols have usual meanings?

8. What are the criteria for linear estimability of a parametric function?

9. What is the purpose of using ANOVA over t-test?

10. What is the basic difference between analysis of variance (ANOVA) and analysis of covariance?

11. Distinguish between one-way and two-way classified data with one observation per cell.

12. What are the basic assumptions of a linear model?

13. What are the assumptions of errors in a linear model?

(Continued)

(3)

14. Explain homoscedasticity with an example.

15. Explain collinearity with an example.

SECTION—B

Answer any *five* questions : 6×5=30

16. State and prove Gauss-Markov theorem.

17. Describe the method of least squares.

18. Observations (x_i, y_i); $i = 1, 2, ..., n$ follow the model

$$y_i = \alpha + \beta x_i + \varepsilon_i$$

where $E(\varepsilon_i) = 0$, $V(\varepsilon_i) = \sigma^2$ and $\text{cov}(\varepsilon_i, \varepsilon_j) = 0$ for $i \neq j$. Find the best linear unbiased estimator of α.

19. Explain the concept of model matrix and its use in estimation.

20. Describe the fixed effect model for one-way classification, stating clearly the assumption involved.

21. Describe the random effects model for one-way classification stating clearly the assumptions involved.

(Turn Over)

22. Describe the analysis of variance in two-way classified data with one observation per cell for fixed effect model.

23. Describe the analysis of covariance in two-way classified data with one observation per cell for fixed effects model.

24. What do you mean by collinearity? Explain one method of checking collinearity.

25. What do you mean by model checking? How do you find prediction from a fitted model?

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