K25U 2368

Reg. No. : .....

Name : .....

V Semester B.Sc. Degree (C.B.C.S.S. – O.B.E. – Regular/Supplementary/ Improvement) Examination, November 2025
(2019 to 2023 Admissions)
CORE COURSE IN STATISTICS
5B07 STA : Regression Techniques and Time Series

Time : 3 Hours Max. Marks :48

PART – A

Answer **all 6** questions. **Each** carries **1** mark.

1. Explain a scatter diagram.
2. What does $R^2 = 0$ imply about a fitted regression model ?
3. If the correlation coefficient is 0.8, the standard deviation of y is 5 and that of x is 4, find the regression coefficient of y on x.
4. State any two advantages of the graphical method in time series analysis.
5. Define trend in a time series.
6. What is a linear regression model ? **(6×1=6)**

PART – B

Answer **any 7** questions. **Each** carries **2** marks.

7. What are the conditions under which a parameter function is BLUE ?
8. What do you mean by error in linear regression ?
9. Explain the concept of partial correlation.
10. Define hat matrix. What is its rank ?

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11. How do you interpret the intercept in a simple linear regression model ?
12. Discuss any two properties of the estimates obtained by the least squares method in multiple regression.
13. What do you mean by multicollinearity ?
14. Explain briefly the role of the moving average in time series analysis.
15. Differentiate between additive and multiplicative time series models. **(7×2=14)**

PART – C

Answer **any 4** questions. **Each** carries **4** marks.

16. Let y_1, y_2, y_3, y_4 be 4 random variables. $E(y_1) = \theta_1 + \theta_3$, $E(y_2) = \theta_1 + \theta_4$, $E(y_3) = \theta_2 + \theta_3$, $E(y_4) = \theta_2 + \theta_4$ check whether θ_2 is estimable.
17. Discuss the estimation procedure for polynomial regression in one variable.
18. Fit a regression line of the form $y = a + bx$ to the following data.

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

19. Given the following time series, compute the 4-yearly moving average.

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Tonnage of goods carried	2204	2500	2360	2680	2424	2634	2904	3098	3172	2952	3248	3172

20. Discuss the steps involved in the method of simple averages.
21. Describe the steps for testing the overall significance of a multiple regression model using the F-test. **(4×4=16)**

PART – D

Answer **any 2** questions. **Each** carries **6** marks.

22. Let Y_i (i = 1, 2, 3, 4) be independent random variables with common variance σ^2 and $E(Y_1) = E(Y_2) = \theta_1 - \theta_2$, $E(Y_3) = E(Y_4) = \theta_1 - \theta_3$. Show that $2\theta_1 - \theta_2 - \theta_3$ is estimable. Also, find its BLUE.
23. State and prove Gauss Markov theorem.
24. Describe the method of fitting a curve $Y = ab^x$. Apply it to the following data.

1. X	2. 2	3. 3	4. 4	5. 5	6. 6
7. Y	8. 144	9. 172.8	10. 207.4	11. 248.8	12. 298.6

25. Explain the ratio-to-moving average method for computing seasonal indices. Discuss the merits and demerits. **(2×6=12)**