17P161 (Pages:3) Name: .....

Reg. No.....

FIRST SEMESTER M.Sc. DEGREE EXAMINATION, DECEMBER 2017

(Regular/Supplementary/Improvement)

(CUCSS-PG)

CC15P ST1 C04 – REGRESSION AND LINEAR PROGRAMMING

(Statistics)

(2015 Admission Onwards)

Time: Three Hours Maximum: 36 Weightage

PART A

Answer ***all*** questions. Each question carries 1 Weightage.

1. Define simple linear regression. Find the prediction interval for the future observation.
2. Define coefficient of determination R^2. Interpret various values of R^2.
3. Explain a multiple linear regression model.
4. Explain a method for checking normality assumption in a regression model.
5. Define orthogonal polynomial.
6. Briefly describe Poisson Regression model.
7. Solve following problem graphically

   Maximize $Z = 3x_1+2x_2$ subject to the constrains

   $-2x_1+x_2 \leq 1$,

   $x_1 \leq 2$,

   $x_1+x_2 \leq 3$; and $x_1, x_2 \geq 0$
8. Distinguish between degeneracy and cycling in LPP. Give an example.
9. Define transportation problem and explain North West corner rule for finding initial basic feasible solution to an m x n transportation problem.
10. Define LPP and non digenetic basic solution of LPP.
11. Explain travelling salesman problem.
12. What is a symmetric game? Show that the value of a symmetric game is zero.

(12 x 1=12 weightage)

PART B

Answer any ***eight*** questions. Each question carries 2 Weightage.

13. i) Obtain the least square estimates of slope and intercept in a simple linear regression model ii) Compute the mean and variance of the estimates.
14. Define residual. Explain different methods for scaling residuals.

Turn over

15. Explain (i) generalised least squares (ii) Lack of fit of the regression model.
16. Define polynomial regression model. Explain important consideration that arises when fitting a polynomial in one variable.
17. Explain test for significance of regression.
18. Develop confidence interval for the parameter slope for a simple linear regression model.
19. Explain the Simplex procedure in solving an LPP.
20. (i)Show that the dual of the dual is primal.(ii) Prove weak duality theorem.
21. Define sensitivity analysis. Given the LPP

    Max $Z = 3x_1+5x_2$ subject to

    $x_1+x_2 \leq 1$,

    $2x_1+3x_2 \leq 1$,

    $x_1, x_2 \geq 0$

    obtain the variation in cost C_j (j =1,2) which are permitted without changing the optimal solution.
22. Write notes on i) plot of residual against the regression ii) partial residual plot
23. Using Big-M method solve following LPP

    Max $Z=3x_1+2x_2$ subject to

    $2x_1+x_2 \leq 2$,

    $3x_1+4x_2 \geq 12$,

    $x_1, x_2 \geq 0$
24. Solve the following 2 x 3 game graphically

	Player B		
Player A	1	3	11
	8	5	2

(8 x 2=16 weightage)

PART C

Answer any ***two*** questions. Each question carries 4 Weightage.

25. a) Explain regression models with a binary response variable.

    b) Describe a regression model where the response variable represents a count of some rare event.
26. Define Studentized residual. Explain residual plots and indicate its use in respect of a) Goodness of fit of the model b) Constant variance assumption c) Normality assumption.
27. Use revised simplex method to solve the LPP

    Max $Z= 3x_1+2x_2+5X_3$ subject to

    $x_1+2x_2+x_3 \leq 430$,

    $3x_1+2x_3 \leq 460$,

    $x_1, x_2, x_3 \geq 0$

28. A company has 4 tasks to be performed by 4 agencies who differ in efficiency and task differ in their difficulty; estimate of the time each agent would take to perform each task is given in the matrix below. How the task should be allocated, one to an agents as to minimize the total man hours.

Task	A_1	A_2	A_3	A_4
A	1	4	6	3
B	9	7	10	9
C	4	5	11	7
D	8	7	8	5

(2 x 4=8 weightage)

****