FIRST SEMESTER M.Sc. DEGREE EXAMINATION, NOVEMBER 2016

(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. Weightage 1 for each question)

1. Define simple linear regression model and state least square estimates of the coefficients.
2. What are logistic regression models? Explain the terms involved in it.
3. Explain the concept of orthogonal polynomials. How it is useful in multiple regression analysis.
4. Define coefficient of determination. State its importance in regression analysis.
5. Explain Graphical solution method.
6. Explain the terms regressor and response variable.
7. Prove that dual of a dual is Primal.
8. Prove that the set of feasible solution to an LPP is convex set.
9. Explain North-West corner rule.
10. Distinguish between degeneracy and cycling in a LPP.
11. Explain travelling salesman problem.
12. Write a short note on post optimal sensitivity analysis.

((12 x 1=12 weightage)

Part B

(Answer any *eight* questions. Weightage 2 for each question)

13. Show that in the classical regression model least square estimator of β and σ^2 are independent distributed.
14. Explain the problem of prediction in GLM.
15. Describe Poisson regression model and explain a method for its estimation.
16. State and prove Gauss Markov theorem.
17. Explain the criteria for evaluating subset regression model.
18. What is symmetric game? Show that the value of a symmetric game is zero.
19. Use duality to solve the following LPP :

$$\text{Max } Z = 2x_1 + x_2$$
$$\text{Subject to} \quad x_1 + 2x_2 \leq 10$$
$$x_1 + x_2 \leq 6$$
$$x_1 - x_2 \leq 2$$
$$x_1 - 2x_2 \leq 1$$
$$x_1, x_2 \geq 0$$

(1)

20. Explain big M method of solving LPP.
21. Prove that the number of basic variables in a transportation problem are almost
    m+n-1, where m is number of origins and n is number of destination
22. Explain stepwise regression concept.
23. State and prove weak duality theorem.
24. Explain the theory of dominance in the solution of rectangular games. Illustrate with
    example.

(8 x 2=16 weightage)

Part C
(Answer any *two* questions. Weightage 4 for each question)

25. (a) Define a multiple linear regression model. Derive least squares estimator of regression
    coefficients vector and show that it is BLUE.
    (b) Define Studentised residuals.
26. What are Generalized Linear Models (GLM)? Explain the parameter estimation technique
    to this model.
27. Explain dual simplex and simplex method to solve the LPP and differentiate between
    them.
28. Obtain the optimum solution to the following transportation problem, cell entries
    representing the unit costs.

							Required
	5	3	7	3	8	5	3
	5	6	12	5	7	11	4
	2	8	3	4	8	2	2
	9	6	10	5	10	9	8
Available	3	3	6	2	1	2	17

(2 x 4=8 weightage)

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