LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – **STATISTICS**

SIXTH SEMESTER – **APRIL 2015**

ST 6604/ST 6601 – OPERATIONS RESEARCH

Date : 23/04/2015 Dept. No. Max. : 100 Marks

Time : 09:00-12:00

PART – A

Answer ALL the questions: **(10 x 2 = 20 marks)**

1. What is operations research?
2. Define Slack and Surplus variables in LPP.
3. Explain optimum basic feasible solution.
4. Define artificial variables.
5. What is Transportation problem?
6. Explain Transshipment problem.
7. What is CPM?
8. Write any two difficulties in using Network.
9. Explain Decision under uncertainty.
10. Define Saddle point.

PART – B

Answer any FIVE questions: **(5 x 8 = 40 marks)**

11. What are the different phases of Operations Research? Explain.
12. Use the graphical method to solve the following LPP.

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

    $x_1 + x_2 \le 30,\ x_1 + x_2 \ge 0,\ x_2 \ge 3,$
    $0 \le x_1 \le 20,$ *and* $0 \le x_2 \le 12.$

13. Describe Big M method in solving a LPP.
14. Use two-phase simplex method to maximize

    $Z = 5x_1 + 3x_2$ subject to the constraints;

    $2x_1 + x_2 \le 1,\ x_1 + 4x_2 \ge 6,$ *and* $x_1, x_2 \ge 0.$

15. Obtain an initial basic feasible solution to the following transportation problem using the north-west corner rule.

	D	E	F	G	Available
A	11	13	17	14	250
B	16	18	14	10	300
C	21	24	13	10	400
Requirement	200	225	275	250	

16. Give the mathematical formulation of an assignment problem.

17. Write the rules of network construction.

18. Write notes on (a) Laplace Criterion, (b) Minimax regret criterion.

PART – C

Answer any TWO questions: **(2 x 20 = 40 marks)**

19. a) Obtain all the basic solutions for

$$x_1 + 2x_2 + 3x_3 = 5$$
$$2x_1 + x_2 + 2x_3 = 4.$$

b) Use penalty (or Big M) method to

Maximize $Z = 6x_1 + 4x_2$ subject to the constraints:

$$2x_1 + 3x_2 \le 30,$$
$$3x_1 + 2x_2 \le 24,$$
$$x_1 + x_2 \ge 3,$$
$$x_1 \ge 0 \text{ and } x_2 \ge 0.$$

Is the solution unique? Verify graphically. (6+14)

20. (a) What is the difference between simplex method and dual simplex method? Explain.

(b) Find the initial basic feasible solution to the following transportation problem using Vogel's Approximation method, given the cost matrix.

	D_1	D_2	D_3	D_4	Supply
S_1	20	25	28	31	200
S_2	32	28	32	41	180
S_3	18	35	24	32	110
Demand:	150	40	180	170	

21. (a) Explain how will you solve the 2 x 2 game when there is no saddle point. (10)

(b) Solve the following game graphically. $Player\ A \begin{bmatrix} 1 & 3 & 4 \\ 5 & 2 & 6 \end{bmatrix}$ (Player B). (10)

22. (a) A project has the following time schedule:

Activity	Time in weeks
1-2	2
1-3	2
1-4	1
2-5	4
3-6	8
3-7	5
4-6	3
5-8	1
6-9	5
7-8	4
8-9	3

Construct PERT network and compute:

(i) Total float for each activity: and

(ii) Critical path and its duration. (15)

(b) Explain PERT in detail. (5)

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