LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

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

SIXTH SEMESTER – **APRIL 2018**

ST 6607 / ST 6604 – OPERATIONS RESEARCH

Date: 19-04-2018   Dept. No.   Max. : 100 Marks
Time: 09:00-12:00

PART A

Answer ALL the questions: (10X2=20)

1) What is meant by optimum solution of a linear programming problem?

2) Define objective function.

3) Define primal and dual problem

4) What is the role of artificial variables in the simplex method?

5) State the conditions for existence of feasible and optimal solution in transportation problem.

6) Mention the methods available to obtain initial basic feasible solution in transportation problem.

7) Define savage criterion in decision making.

8) What is critical path?

9) What is game theory?

10) Define the term optimal strategy.

PART B

Answer any FIVE questions: (5 X 8=40)

11) A company makes two kinds of leather belts. Belt A is a high quality belt, and belt B is of lower quality. The respective profits are Rs.4.00 and Rs. 3.00 per belt. Each belt of type A requires twice as much time as a belt of type B, and if all belts were of type B, the company could make 1000 per day. The supply of leather is sufficient for only 800 belts per day (both A and B combined). Belt A requires a fancy buckle and only 400 per day are available. There are only 700 buckles a day available for belt B. Determine the optimal product mix.

12) Explain the penalty method for solving linear programming problem.

13) Explain the various steps involved in formulating a dual problem.

14) A company has four machines to do four jobs. Each job can be assigned to one and only one machine. The cost of each job on each machine is given in the following table.

		Machines			
		1	2	3	4
	A	18	24	28	32
Jobs	B	8	13	17	19
	C	10	15	19	22
	D	14	10	20	18

Determine the optimal assignment of jobs to machines.

15) Explain critical activity, dummy activity and float of an activity in CPM.

16) Distinguish between PERT and CPM.

17) Explain Laplace and Savage criteria used in decision making under uncertainty.

18) Reduce the following game by graphical method and find the game value.

	I	II	III	IV
I	3	2	4	0
II	3	4	2	4

PART C

Answer any TWO questions: **(2X20=40)**

19) Describe simplex method of solving linear programming problem.

20) Solve the following problem by simplex method

$$Max\ Z = x_1 + 2x_2 + 3x_3 - x_4$$

Subject to

$$x_1 + 2x_2 + 3x_3 = 15$$
$$2x_1 + x_2 + 5x_3 \geq 20$$
$$x_1 + 2x_2 + x_3 + x_4 \geq 10$$
$$x_1, x_2, x_3, x_4 \geq 0$$

21) Solve the transportation problem with unit transportation costs in rupees, demands and supplies as given below:

	D₁	D₂	D₃	Supply (units)
A	5	6	9	100
B	3	5	10	75
C	6	7	6	50
D	6	4	10	75
Demand (units)	100	80	120	

22) (a) Calculate the critical path and project duration for the project whose activities are given below:

Activity	1-2	1-3	1-5	2-3	2-4	3-4	3-5	3-6	4-6	5-6
Duration(in weeks)	8	7	12	4	10	3	5	10	7	4

(b) For the following cost matrix, suggest the best decision according to

(i) Maximin criterion

(ii) Hurwicz criterion with $\alpha = 0.2$

	N₁	N₂
D₁	30	35
D₂	−20	10

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