

(Following Paper ID and Roll No. to be filled in your Answer Book)

Paper ID : 199373

Roll No.

B. Tech.

(SEM. VII) THEORY EXAMINATION, 2015-16

OPERATION RESEARCH

[Time:3 hours]

[Total Marks:100]

Section - A

1. Attempt all parts. All parts carry equal marks. Write answer of each part in short : (2x10=20)
- What is linear programming ?
 - What is meant by a feasible solution of an LP problem ?
 - What is basic solution of an LP problem ?
 - What is degeneracy in transportation problems ?
 - What is meant by unbalanced transportation problem ?
 - What are assignment problems ? Give two applications.

- (g) What is float ? What are the different types of floats?
- (h) Distinguish between PERT and CPM.
- (i) What is looping and dangling in network diagram ?
- (j) Discuss the various costs involved in an inventory model.

Section - B

Attempt any five questions from this section : (10x5=30)

2. Solve the following LP problem graphically

$$\text{Maximize } Z = -x_1 + 2x_2$$

Subject to constraints

$$(i) x_1 - x_2 \leq -1 \quad (ii) -0.5x_1 + x_2 \leq 2 \quad \text{and } x_1, x_2 \geq 0$$

3. Use Vogel's Approximation Method (VAM) to find initial basic feasible solution to the transportation problem.

	D1	D2	D3	D4	Supply
S1	19	30	50	10	7
S2	70	30	40	60	9
S3	40	8	70	20	18
Demand	5	8	7	14	34

4. A department of a company has five employees with five jobs to be performed. The time (in hours) that each man takes to perform each job is given in the effectiveness matrix.

		Employees				
		I	II	III	IV	V
Jobs	A	10	5	13	15	16
	B	3	9	18	13	6
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

5. Draw the network diagram of activities for the project :

Activities	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
Predecessor															
Activity	-	A	A	C	B	C	D, E	G	H	F	I, J	K	L	J	M, N

6. Briefly explain the different phases of project management.
7. Solve the game whose payoff matrix is given below :

Player A	B1	B2	B3	B4
A1	3	2	4	0
A2	3	4	2	4
A3	4	2	4	0
A4	0	4	0	8

8. A company that operates for 50 weeks in a year is concerned about its stock of copper cable. This costs Rs. 240 a meter and there is a demand for 8,000 meters a week. Each replenishment costs Rs. 1,050 for administration and Rs. 1,650 for delivery, while holding costs are estimated at 25 per cent of value held a year. Assuming no shortages are allowed, what is the optimal inventory policy for the company ?

How would this analysis differ if the company want to maximize its profits rather than minimize cost ? What is the gross profit if the company sells the cable for Rs. 360 a meter ?

9. Define : (i) Competitive game (ii) Payoff matrix (iii) Pure and mixed strategies (iv) Saddle point and (v) Optimal strategies

Section - C

Attempt **any two** questions from this section. (15x2=30)

10. Use the simplex method to solve the following LP problem :

$$\text{Maximize } Z = 3x_1 + 5x_2 + 4x_3$$

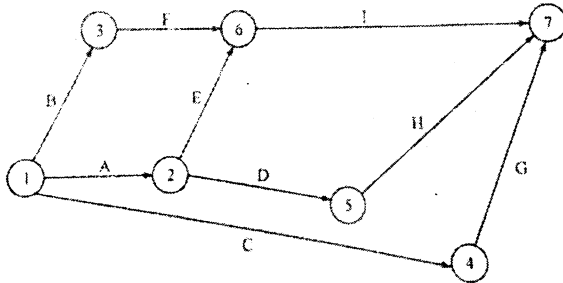
Subject to constraints

$$(i) \quad 2x_1 + 3x_2 \leq 8 \quad (ii) \quad 2x_2 + 5x_3 \leq 10$$

$$(iii) \quad 3x_1 + 2x_2 + 4x_3 \leq 15 \text{ and } x_1, x_2, x_3 \geq 0$$

11. The following network diagram represents activity associated with a project :

Activities	A	B	C	D	E	F	G	H	I
Optimistic time	5	18	26	16	15	6	7	7	3
Pessimistic time	10	22	40	20	25	12	12	9	5
Most likely time	8	20	33	18	20	9	10	8	4



Determine :

- Expected completion time.
 - Variance of each activity and critical path.
12. The following table provides all the necessary information on the availability of supply to each warehouse, the requirement of each market and the unit transportation cost (in Rs) from each warehouse to each market.

	Market					
		P	Q	R	S	Supply
	A	6	3	5	4	22
Warehouse	B	5	9	2	7	15
	C	5	7	8	6	8
	Demand	7	12	17	9	45

The shipping clerk of the shipping agency has worked out the following schedule, based on his own experience: 12 units from A to Q, 1 unit from A to R, 9 units from A to S, 15 units from B to R, 7 units from C to P and 1 unit from C to R.

- Check and see if the clerk has the optimal schedule.
- Find the optimal schedule and minimum total transport cost.
- If the clerk is approached by a carrier of route C to Q who offers to reduce his rate in the hope of getting some business, by how much should the rate be reduced before the clerk would offer him the business.

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