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

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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)

   (a) What is linear programming ?

   (b) What is meant by a feasible solution of an LP problem ?

   (c) What is basic solution of an LP problem ?

   (d) What is degeneracy in transportation problems ?

   (e) What is meant by unbalanced transportation problem ?

   (f) 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

Maximize $Z = -x_1 + 2x_2$

Subject to constraints

(i) $x_1 - x_2 \leq -1$ (ii) $-0.5x_1 + x_2 \leq 2$ and $x_1, x_2 \leq 0$

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
	A	10	5	13	15	16
	B	3	9	18	13	6
Jobs	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 if 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 :

Maximize $Z = 3x_1 + 5x_2 + 4x_3$

Subject to constraints

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

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

		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.

(a) Check and see if the clerk has the optimal schedule.

(b) Find the optimal schedule and minimum total transport cost.

(c) 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.

—x—