

ME324: IEOR

Assignment 05: Transportation and Network Models

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1. A company has three production facilities S_1 , S_2 and S_3 with production capacity of 7, 9 and 18 units (in 100s) per week of a product, respectively. These units are to be shipped to four warehouses D_1 , D_2 , D_3 and D_4 with requirement of 5, 8, 7 and 14 (in 100s) per week, respectively. The transportation cost (in INR) per unit between factories to warehouses are give below:

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

- Formulate this transportation problem as a LP model to minimize the total transportation cost.
 - Use North-West Corner method to find an initial basic feasible solution.
 - Use Least Cost method to find an initial basic feasible solution.
 - Use Vogel's Approximation method to find an initial basic feasible solution.
 - Find the optimal solution using transportation algorithm.
2. A company has received a contract to supply gravel to three new construction projects located in towns A, B and C. The construction engineers have estimated the required amounts of gravel which will be needed at these construction projects are:

Project Location	Weekly Requirement (Truck loads)
A	72
B	102
C	41

The company has 3 gravel pits located in towns X, Y and Z. The gravel required by the construction projects can be supplied by three pits. The amount of gravel that can be supplied by each pit is as follows:

Plant:	X	Y	Z
Amount available (Truckloads):	76	82	77

The company has computed the delivery cost from each pit to each site. These costs (in INR) are shown in the following table:

	A	B	C
X	4	8	8
Y	16	24	16
Z	8	16	24

Schedule the shipment from each pit to each project in such a manner that it minimizes the total transportation cost within the constraints imposed by pit capacities and project requirement. Also find the minimum cost.

3. 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
	C	10	7	2	2	2
	D	7	11	9	7	12
	E	7	9	10	4	12

How should the job be allocated, one per employee, so as to minimize the total man-hours?

4. The following network diagram represents activities 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 the following:

- The critical path.
- The probability of expected completion time of the project if the original scheduled time of completing the project is 41.5 weeks.
- The duration of the project that will have 95 per cent chance of being completed.

