ASSIGNMENT-12

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1 QUESTION No-2.28(Optimization)

Two godowns A and B have grain capacity of 100 quintals and 50 quintals respectively.They supply to 3 ration shops, D, E and F whose requirements are 60, 50 and 40 quintals respectively. The cost of transportation per quintal from the godowns to the shops are given in the following table: How

Transportation cost per quintal (in rupees)		
From/To	A	B
D	6	4
E	3	2
F	2.50	3

TABLE 1.1: Transportation table

should the supplies be transported in order that the transportation cost is minimum? What is the minimum cost?

2 Solution

The given table can be written as follows,

		Destination			
		D	E	F	Supply
Supplier	A	6	3	2.50	100
	B	4	2	3	50
Demand		60	50	40	150

We solve this problem by Vogel's approximation method (VAM)

1) For each row (excluding the demand row) we find the least value and then the second least value and take the absolute difference of these two least values.We see that for row1 and row2 the penalty is 0.50 and 1 respectively.

2) For each column (excluding the supply column) we find the least value and then the second least value and take the absolute difference of these two least values.We get 2,1, and 0.50 for column1,column2 and column3 respectively.

3) We select the row or column with the maximum penalty and find cell that has least cost in selected row or column. Allocate as much as possible in this cell.We see that among all the penalties we have maximum penalty to be 2 (first column penalty).In that column minimum cost is 4, the maximum allocation for 4 is 50. We can cancel out row2 (corresponding to B).Thus we have,

		Destination			
		D	E	F	Supply
Supplier	A	6	3	2.50	100
	B	4(50)	2	3	50
Demand		60 10	50	40	150

4) Similarly we find penalty for remaining row1 and columns 1,2 and 3. For row 1 it is 0.50, column1 it is 6,column2 it is 3 and column3 it is 2.50. Maximum among the penalty is 6 so we choose column1 and the minimum cost is 6 and the maximum required allocation is 10.Thus we have,

		Destination			
		D	E	F	Supply
Supplier	A	6(10)	3	2.50	100 90
	B	4(50)	2	3	50
Demand		60	50	40	150

5) Now similarly we do for the remaining row and columns.We get the penalty of row1 to be 0.50 and for column2 and column3 we have 3 and 2.50 respectively. Among the penalties the maximum is 3 and we allocate 50.Thus we have,

		Destination			
		D	E	F	Supply
Supplier	A	6(10)	3(50)	2.50	100 40
	B	4(50)	2	3	50
Demand		60	50	40	150

6) Now the remaining 40 is allocated to the cell with cost 2.50.

		Destination			
		D	E	F	Supply
Supplier	A	6(10)	3(50)	2.50(40)	100
	B	4(50)	2	3	50
Demand		60	50	40	150

The minimum cost is,

$$6\,(10) + 3\,(50) + 2.50\,(40) + 4\,(50) = 510 \quad (2.0.1)$$

Hence A should supply 10,50,40 quintals to D,E and F respectively. And B should supply 50 quintals to D only. Thus by following this we get the transportation cost to be ₹510.