ASSIGNMENT :- 15

TRANSPORTATION MODEL AND IT'S VARIANTS

SunRay Transport company ships truckloads of gain from the silos to four mile mills. The supply in (truckload) on the different routes are summarized in table. The unit of transportation costs c_{ij} (shown in the north west corner of each box) are in hundred of dollars. The model seeks the minimum cost shipping schedule between the silos and the mills.

			Mills			
		1	2	3	4.	Supply.
	1	10	2	20	11	15
		x_{11}	x_{12}	x_{13}	x_{14}	
Silos	2	12	7	9	20	25
		x_{21}	x_{22}	x_{23}	x_{24}	
	3	4	14	16	18	10
		x_{31}	x_{32}	x_{33}	x_{34}	
Demand		5	15.	15	15	2

Find the minimum cost shipping by.
1 North west corner method.
2 heast cost method.
3 Vogel Approximation method.

NORTH WEST CORNER METHOD

	1	2	3	4	
1	10 [5]→[10]	2	20	11	15/10/0
2	12	7 [5]→[15]→[5]	9	20	25/20/5
3	4	14	16	18 [10] · 10	
	5/0	15/5/0	15/0	15	

The arrows show the order in which allocated amounts are generated.

The starting basic solution is $x_{11} = 5$, $x_{12} = 10$, $x_{22} = 5$

$$x_{23} = 15, \quad x_{24} = 5, \quad x_{34} = 10$$

The associated cost of the schedule is

$$Z = 10 \times 5 + 2 \times 10 + 7 \times 5 + 9 \times 15 + 20 \times 5 + 16 \times 10$$
$$= 520$$

LEAST COST METHOD:-

	1	2	3	4	
1	10	2 start [15]	20	11	15/0
2	11	7 [15]	9 [10] end	20	25/10
3	[5] 4	14	16 [5]	18 · 10/5	
	5/0	15/0	15/0	15	

The arrow show order in which allocation are made from the least cost

The starting solution is $X_{12} = 15$, $X_{23} = 15$, $X_{24} = 16$

$X_{31} = 5$, $X_{34} = 5$

The associated objective value is

$z = 2 \times 15 + 4 \times 5 + 9 \times 15 + 18 \times 5 + 20 \times 10$

$= 475$

VOGEL APPROXIMATION METHOD

	1	2	3	4		row plenty			
1	10	2 (15)	20	11	15/0	10-2 =8	11-2 =9	—	—
2	12	7	9 (15)	20 (10)	25/10	9-7 =2	9-7 =2	20-9 =11	20
3	4 (5)	14	16	18 (5)	10/5	14-4 =10	16-14 =2	18-16 =2	18
	5/0	15/0	15/0	15					
column plenty	10-4 =6	7-2 =5	16-9 =7	18-11 =7					
	—	7-2 =5	6-9 =7	16-11 =7					
	—	—	16-9 =7	20-16 =2					
	—	—	—	20-16 =2					

In applying the vogel's Approximation method (VAM). penalties are computed for each row and column starting with 3rd row the highest plenty is found assigning the maximum possible amount to statisfy it. Then penalties are recomputed and process continues statisfy each subsequent highest penalty For row 1, the highest penalty lead to the

assignment of maximum amount to corresponding cell simultaneously statisfy both row 1 and column 2. This process continue until all rows and columns are statisfied. Finally applying the least cost method to the remaining column, assignments are made, completing the solution.

The starting solution is $x_{12} = 15$, $x_{23} = 15$, $x_{24} = 10$, $x_{31} = 5$, $x_{34} = 5$.

The associated objective value is

$$Z = 2 \times 15 + 9 \times 15 + 20 \times 10 + 4 \times 5 + 18 \times 5$$
$$= 475.$$

This solution happens to have the same objective value as in the least cost method.