Operation Research

Q. A Company has a current shipping schedule, which is being questioned by the management. as to whether or not it is optimal. The firm has 3 factories & 4 warehouse. The necessary data in terms of transportation cost in ₹ per unit from a factory to a destination, factory capacities & warehouse requirements are as follows.

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Warehouse	W_1	W_2	W_3	W_4	Requirement
factory					
F_1	19	30	50	10	720
F_2	40	30	40	60	900
F_3	40	[illegible]	70	20	1800
Capacity	500	800	700	1400	

Solve for a basic feasible shipping schedule in terms of lowest possible shipping cost.

Sol^n As Σ Capacity = Σ Requirements The above problem is balanced

we will use Vogel's Approximation Method to solve the above problem.

Requirements = 700 + 900 + 1800 = 3400
Capacity = 500 + 800 + 700 + 1400 = 3400

Iteration 1:-

Warehouse factory	W_1	W_2	W_3	W_4	Requirements	Penal
F_1	19	30	50	10	700	9
F_2	40	30	40	60	900	10
F_3	40	8 (800)	70	20	1800	12
Capacity	500	800	700	1400	3400	-
Penalties.	21	22	10	10	-	-

Iteration 2:-

Warehouse factory	W_1	W_3	W_4	Requirement	Penalty
F_1	19 (500)	50	10	700 200	9
F_2	40	40	60	900	20
F_3	40	70	20	1000	20
Capacity ~~penalties~~	500	700	1400	2600	-
penalties	21	10	10	-	-
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Iteration 3:-

Warehouse factory	W_3	W_4	Requirement	Penalty
F_1	50	10	200	40
F_2	40	60	700	20
F_3	70	20 (1000)	1000	50 ←
Capacity ~~Penalties~~	700	1400 400	2100	-
penalties	10	10	-	-

Iteration 4:-

Warehouse factory	W_3	W_4	Requirement	-
F_2	40 (40)	60 (200)	900	-
Capacity	700	200	900	-
Penalties.	-	-		

Iteration 5:

Warehouse / factory	W_3	W_4	
F_2	40 (400)	60 (200)	900
Capacity	700	200	900
penalties	700	200	

Iteration 5:

Warehouse / factory	W_3	W_4	Requirement
F_2	40 (400)	60 (200)	900
Capacity	700	200	900
Penalties	—	—	

Warehouse / factory	W_1	W_2	W_3	W_4	Require
F_1	19 (500)	30	50	10 (200)	70
F_2	40	30	40 (400)	60 (200)	90
F_3	40	8 (300)	70	20 (1000)	18
Capacity	500	800	700	1400	

Total cost $= 19 \times 500 + 10 \times 200 + 40 \times 700 + 60 \times 200 + 8 \times 300 + 20 \times 1000$

$= 9500 + 2000 + 2800 + 12000 + 6400 + 20000$

$= 52700$