

Advance Engineering Mathematics(AEM)

**Branch :Information Technology,
Sem:IIIrd**



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Vision of the Institute

To become a renowned centre of outcome based learning, and work towards academic, professional, cultural and social enrichment of the lives of individuals and communities

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Mission of the Institute

- Focus on evaluation of learning outcomes and motivate students to inculcate research aptitude by project based learning.
- Identify, based on informed perception of Indian, regional and global needs, the areas of focus and provide platform to gain knowledge and solutions.
- Offer opportunities for interaction between academia and industry.
- Develop human potential to its fullest extent so that intellectually capable and imaginatively gifted leaders may emerge.

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Course Outcomes

- **CO2:** To learn the formulation of different mathematical problems into optimization problems.
- **CO3:** Apply the principles of optimization using differential calculus.
- **CO4:** To understand the concepts of Linear Programming
- **CO1:** To learn the concepts and principles of Random variables and Probability distribution.

Q5. Solve the transportation problem with the initial B.F.S as given below;

	F_1	F_2	F_3	
W_1	2	7	4	5
W_2	3	3	1	8
W_3	5	4	7	7
W_4	1	6	2	14
	7	9	18	

Solve :
Step I

		F_1	F_2	F_3			
W_1	5	2	7	4	5		
W_2		3	3	8	1	8	
W_3		5	7	4	7	7	
W_4	2	1	2	6	10	2	14
		7	9	18			

STEP II: Determine a set of u_i , $i=1$ to m ; v_j , $j=1$ to n , such that for each occupied cell (r,s) $C_{rs}=u_r+v_s$. For this we assign an arbitrary value to one of the u_i 's or v_j 's and rest of them can be calculated easily from it. Generally we choose that u_i or v_j equal to 0.

Taking occupied cell: $C_{rs}=u_r+v_s$.

$$C_{11}=u_1+v_1=2,$$

$$C_{23}=u_2+v_3=1,$$

$$C_{32}=u_3+v_2=4,$$

$$C_{41}=u_4+v_1=1,$$

$$C_{42}=u_4+v_2=6,$$

$$C_{43}=u_4+v_3=2,$$

Let $u_4=0$,

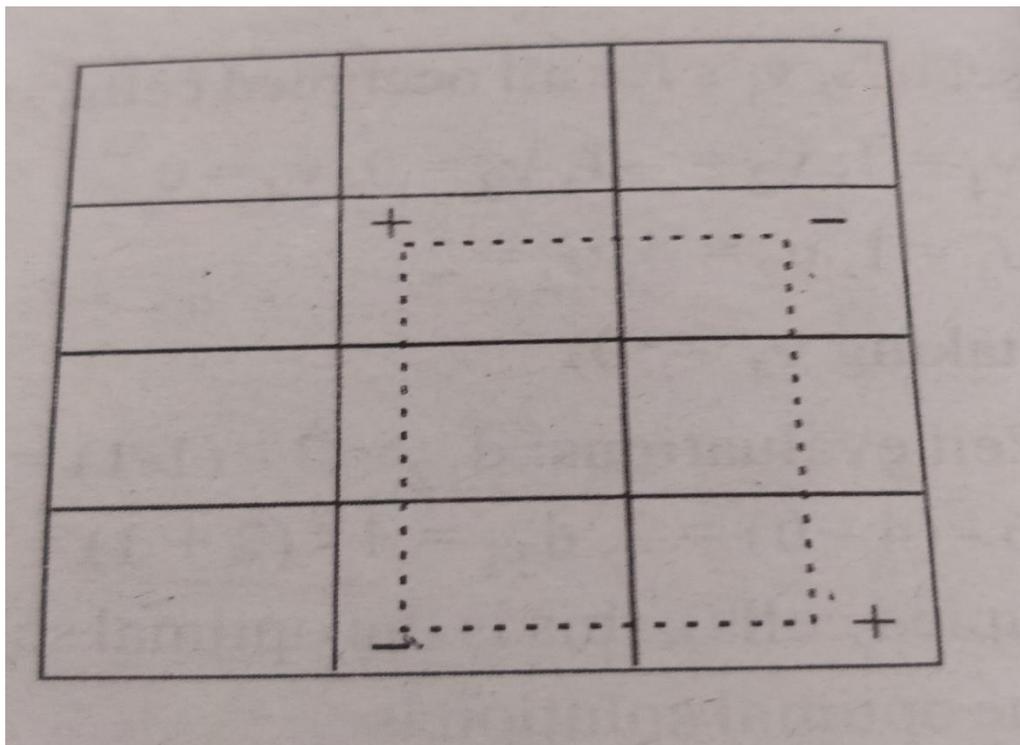
Now find the values of

$$u_1=1, v_1=1, v_2=6, v_3=2, u_4=0, u_2=-1, u_3=-2,$$

Step III: We Calculate cell evaluation d_{ij} for each unoccupied cell (i,j) by the formula $d_{ij} = C_{ij} - (u_i + v_j)$,

$$D_{12}=0, \quad D_{13}=1, \quad D_{21}=3, \quad D_{22}=-2, \quad D_{31}=6, \quad D_{33}=7,$$

5	2		7		4	5
	3		3	8	1	8
	5	7	-2		7	7
2	1	2	6	10	2	14
	7		9		18	



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W_1	5	2	7	4	5		
W_2		3	2	3	6	1	8
W_3		5	7	4	7	7	
W_4	2	1		6	12	2	14
		7		9		18	

Optimality test:

Let $u_4=0$,

Now find the values of

$$u_1=1, v_1=1, v_2=4, v_3=2, u_4=0, u_2= -1, u_3= 0,$$

We Calculate cell evaluation d_{ij} for each unoccupied cell (i, j) by the formula $d_{ij} = C_{ij}-(u_i+v_j)$,

$$D_{12}=2, \quad D_{13}=1, \quad D_{21}=3, \quad D_{42}=2, \quad D_{31}=4, \quad D_{33}=5$$

Since optimality test holds good ,the given solution is optimal and unique.

Ans: 76

UNBALANCED TRANSPORTATION PROBLEM:

Q6. Obtain the Optimal transportation plan from the following table giving the plant to market shipping costs and quantities required at each market and availability at each plant.

Market plant	M ₁	M ₂	M ₃	M ₄	Availability (Supply)
A	4	6	8	13	50
B	13	11	10	8	70
C	14	4	10	13	30
D	9	11	13	8	50
Requirement Demand	25	35	105	20	200 185

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Solve: We can see, it is unbalanced. First of all use dummy column

Market plant	M_1	M_2	M_3	M_4	M_5	Availability (Supply)
A	4	6	8	13	0	50
B	13	11	10	8	0	70
C	14	4	10	13	0	30
D	9	11	13	8	0	50
Requirement Demand	25	35	105	20	15	200 200

Further solve it.....

THANK YOU

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References:

1. https://www.google.com/search?q=npTEL+tansportation+method&rlz=1C1CHBF_enIN723IN723&oq=npTEL+tansportation+method&aqs=chrome..69i57j33.59187j0j7&sourceid=chrome&ie=UTF-8#kpvalbx=_IMNEX_DGFJyd4-EP_-ip-Ag28
2. Optimization Techniques for Engineering by Nilama Gupta