Advance Engineering Mathematics(AEM)

Branch :Information Technology, Sem:III$^{\text{rd}}$

Dr. Kashish Parwani

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JECRC, Sitapura Jaipur

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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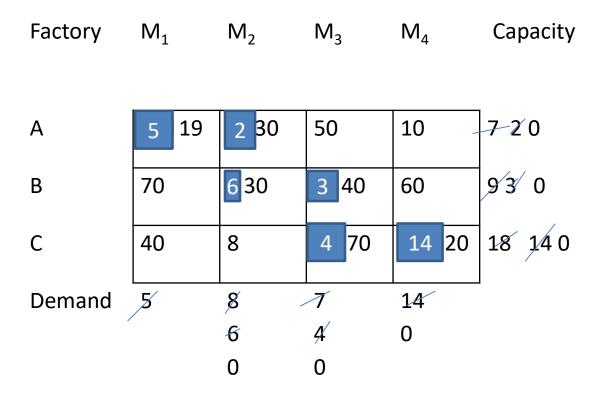
Mission of the Institute

- 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

- **CO1:** To learn the concepts and principles of Random variables and Probability distribution.

- **CO2:** To learn the formulation of different mathematical problems into optimization problems.

- **CO3:** Apply the principles of optimization using differential calculus.

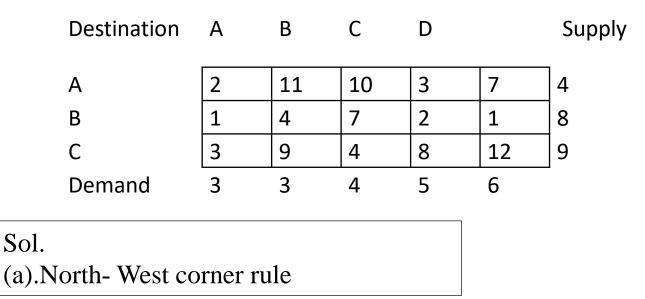- **CO4:** To understand the concepts of Linear Programming.

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North-West Corner Method

Q6.Determine the initial B.F.S to following transportation problem, using
(a).North- West corner rule,

Factory	M_1	M_2	M_3	M_4	Capacity
A	5 19	2 30	50	10	~~7~~ ~~2~~ 0
B	70	6 30	3 40	60	~~9~~ ~~3~~ 0
C	40	8	4 70	14 20	~~18~~ ~~14~~ 0
Demand	~~5~~	~~8~~	~~7~~	~~14~~	
		~~6~~	~~4~~	0	
		0	0		

Ans :1015

(b).Vogel's approximation method(VAM)

Destination	A	B	C	D		Supply
A	2	11	10	3	7	4
B	1	4	7	2	1	8
C	3	9	4	8	12	9
Demand	3	3	4	5	6	

Sol.
(a).North- West corner rule

Factory	M_1	M_2	M_3	M_4	Capacity
A	19	30	50	10	7
B	70	30	40	60	9
C	40	8	70	20	18
Demand	5	8	7	14	

- Ans:$x_{11}=5$, $x_{12}=2$, $x_{22}=6$, $x_{23}=3$, $x_{33}=4$, $x_{34}=14$

(b).Vogel's approximation method(VAM)

Destination	A	B	C	D		Supply
A	2	11	10	3	7	4
B	1	4	7	2	1	8
C	3	9	4	8	12	9
Demand	3	3	4	5	6	

Ans:$x_{11}=5$, $x_{13}=15$, $x_{14}=20$, $x_{22}=30$, $x_{31}=15$, $x_{35}=5$, $x_{41}=10$
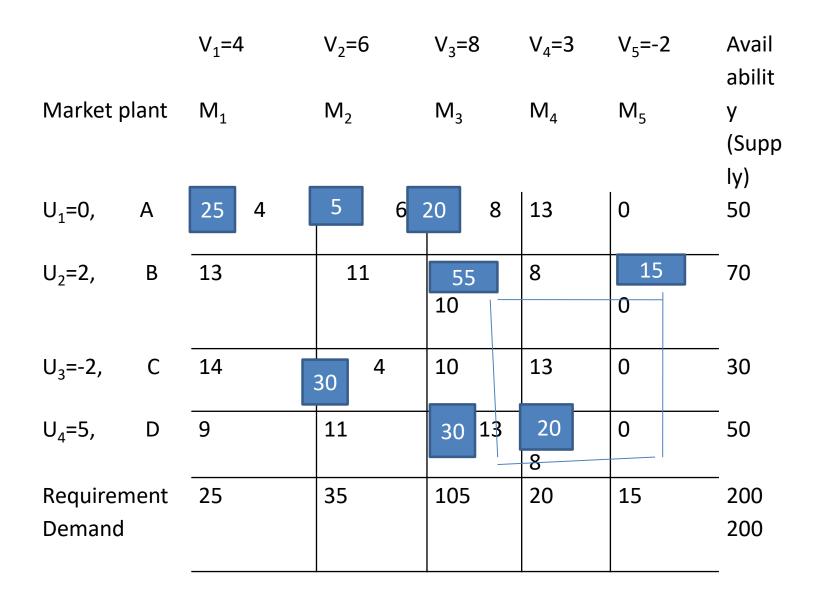
UNBALACED TRANSPORTATION PROBLEM:

Q7. Obtain the 0ptimal 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

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

	$V_1=4$	$V_2=6$	$V_3=8$	$V_4=3$	$V_5=-2$	Availability (Supply)
Market plant	M_1	M_2	M_3	M_4	M_5	
$U_1=0$, A	25 4	5 6	20 8	13	0	50
$U_2=2$, B	13	11	55 10	8	15 0	70
$U_3=-2$, C	14	30 4	10	13	0	30
$U_4=5$, D	9	11	30 13	20 8	0	50
Requirement Demand	25	35	105	20	15	200 200

Optimality test:

Let $u_1=0$,
Now find the values of

$u_1=0$, $v_1=4$, $v_2=6$, $v_3=8$, $v_4=3$, $v_5=-2$, $u_4=5$, $u_2=2$, $u_3=-2$,

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

$D_{14}=10$, $D_{15}=2$, $D_{21}=7$, $D_{22}=3$, $D_{24}=3$, $D_{31}=12$,
$D_{33}=4$, $D_{34}=12$, $D_{35}=4$, $D_{41}=0$, $D_{42}=0$, $D_{45}=-3$

Since the cell evaluation $D_{45}=-3 <0$, the solution under test is not optimal.

Do it………………

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References:

1. https://www.slideshare.net/VishalHotchandani2/transportation-problems-183454172
2. Optimization Techniques for Engineering by Nilama Gupta.
3. https://www.youtube.com/watch?v=RnZnIIksdwU

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