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

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.

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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Q.11.Solve the following Transportation Problem :

	S_1	S_2	S_3	S_4	S_5	S_6	Supply
W_1	9	12	9	6	9	10	5
W_2	7	3	7	7	5	5	6
W_3	6	5	9	11	3	11	2
W_4	6	8	11	2	2	10	9
Demand	4	4	6	2	4	2	22

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Degeneracy Transportation Problem

Destination

	A	B	C	D	E	Supply
1	10	20 2	15 3	15	9	3515 0
2	5	10	15	10 2	30 4	40 30 0
3	20 15	ε 5	14	7	15	20 0
4	20	15	25 13	25	5 8	30 250
Dem and	20 0	20 0	40 25 0	10 0	35 5 0	125

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U-V Method

Step 1. Check whether m+n-1=no. of allocated cells. If no, Goto step 2: if yes, go to step 3.

Step 2.

- Convert the necessary no. of unallocated cells into allocated cells to satisfy the above condition.
- Starting from the least value of the unallocated cell.
- Check the loop formation one by one
- These should be not closed loop formation.
- Select that cell as a new allocated cell and assign '**ε**'.

Step 3.Calculate the value of ui and vj for all the allocated cells by using the formula

$$u_i + v_j = c_{iJ}$$

Step 4: Calculate Penalties dij for all the unallocated cells by using the formula

$$d_{ij} = C_{ij}-(u_i+v_j),$$

Step 5: Check the optimality condition all $d_{ij} \geq 0$, if yes : stop the procedure, **" The optimality is reached"**
Otherwise, go to step 6.
Step 6: Select the most negative (-) value of d_{ij} and consider that cell as the new allocated cell.
Step 7. From the particular cell draw a closed loop. By using horizontal and vertical lines passing through some allocated cells.
[Note: The turning points of the loop should be only at allocated cells]
Step 8: Starting from the new allocated cell, alternatively assign (+) and (-) sign at corner of the closed loop.
Step 9: Select the minimum of the allocated value among the (-) signed cells.
Step 10: Frame the new iteration by Applying the following step:
(a) Add and subtract that selected min. value in all the (+) and (-) signed cells.
(b) Copy the remaining cells value as it is.
(c) Go to step 1.

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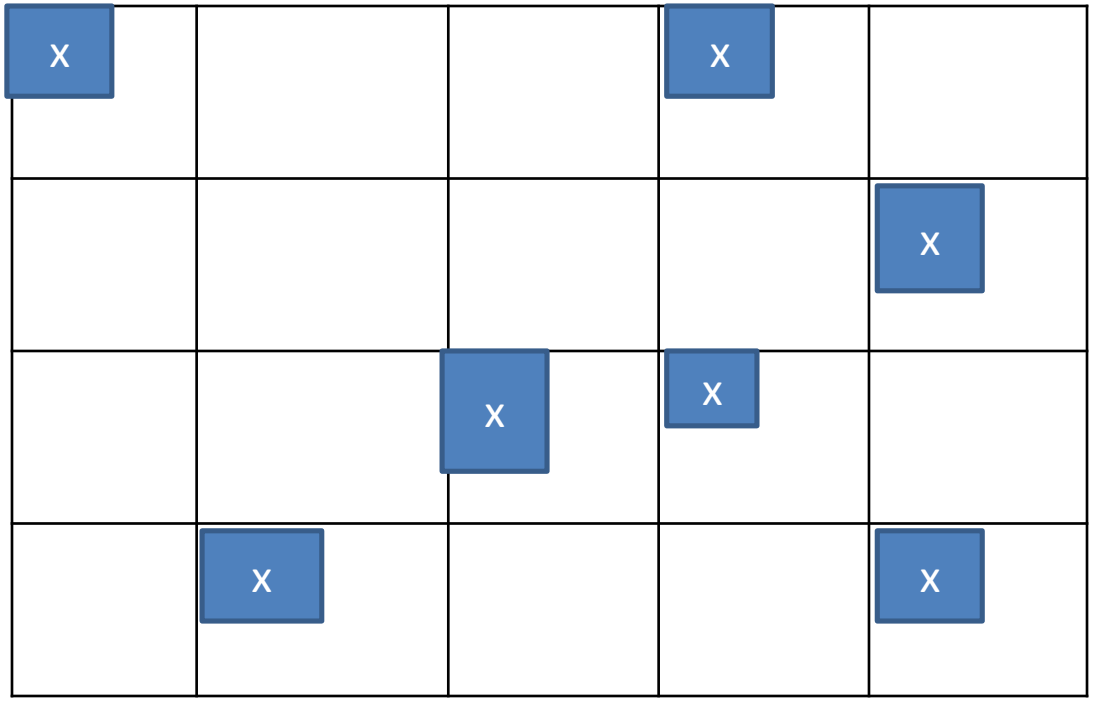

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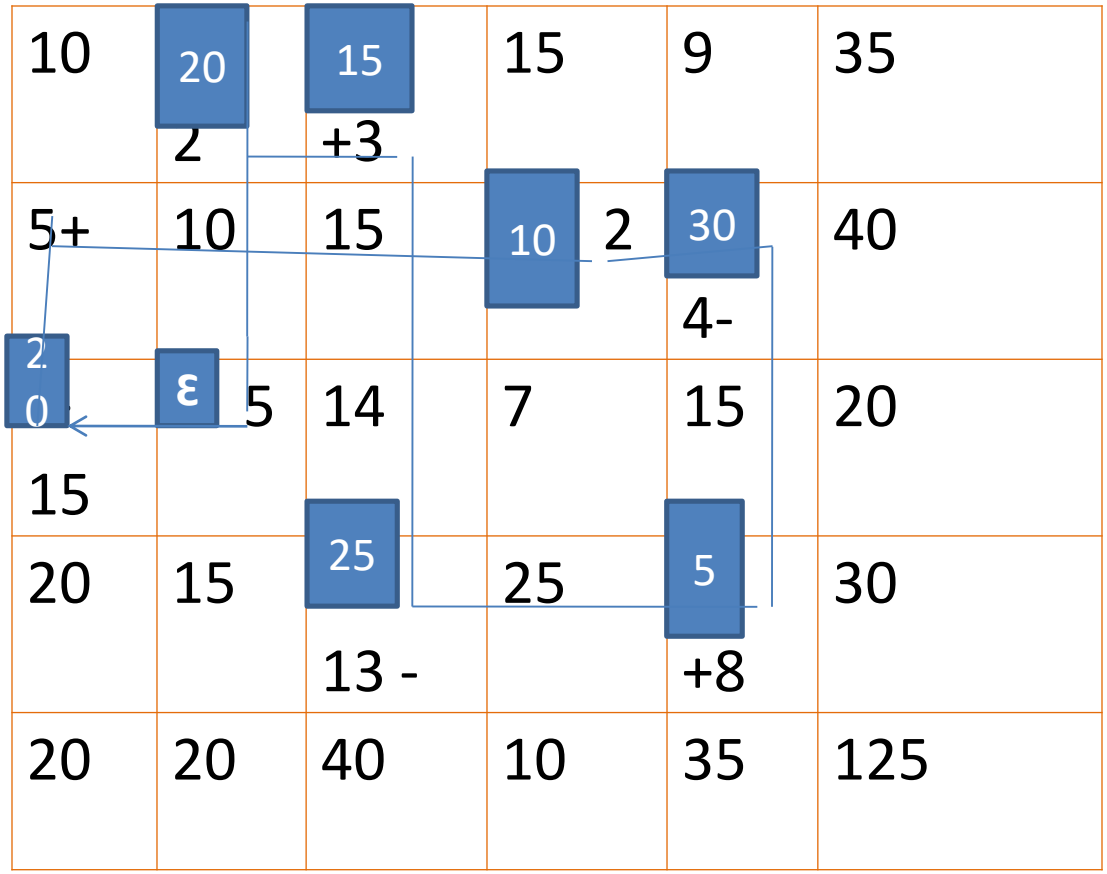

m+n-1= no. of allocated cell

4+5-1=8

Degeneracy Transportation Problem

Destination

	V_1=12 A	v_2=2 B	v_3=3 C	v_4 =-4 D	v_5=-2 E	Supply
u_1=0, 1	10	2	3	15	9	35
u_2 =6, 2	5	10	15	2	4	40
u_3 =3, 3	15	5	14	7	15	20
U_4 =10 4	20	15	13	25	8	30
Demand	20	20	40	10	35	125

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U1=0, u2=6, u3=3, u4=10,v1=12,v2=2,v3=3, v4=-4 v5=-2

$d_{ij} = C_{ij}-(u_i+v_j)$,

$D_{11}= -2$

$D_{14}= 19$

$D_{15}=11$

$D_{21}= -13$ → Taking most negative no.

$D_{22}= 2$

$D_{23}= 6$

$D_{33}= 8$

$D_{34}= 8$

$D_{35}= 14$

$D_{41}= -2$

$D_{42}= 3$

$D_{44}= 19$

Find the values of u_i and v_j

$d_{ij} \geq 0$,

Ans=630

Q1. Solve the following Transportation problem:

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

Ans: Rs. 112

Q2. Solve the following Transportation problem:

	A	B	C	D	E	Supply
1	4	2	3	2	6	8
2	5	4	5	2	1	12
3	6	5	4	7	3	14
Demand	4	4	6	8	8	

Ans: Rs. 80

Q3. Solve the following Transportation problem:

	A	B	C	D	E	Supply
1.	4	3	1	2	6	40
2.	5	2	3	4	5	30
3.	3	5	6	3	2	20
4.	2	4	4	5	3	10
Demand	30	30	15	20	5	100

Ans: Rs. 210

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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
4. https://youtu.be/zN4AE1YjE2I