OPTIMIZATION

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Question:

The cost matrix of a Transportation problem is given by

6	4	1	5
8	9	2	7
4	3	6	2

The following values of the basic variables were obtained at the first iteration :

$x_{11} = 6, x_{12} = 8, x_{22} = 2, x_{23} = 14, x_{33} = 1, x_{34} = 4$

Then :

Options :

(A) the current solution is optimal.

(B)the current solution is non optimal and the entering and leaving variables are x_{31} and x_{33} respectively.

(C)the current solution is non optimal and the entering and leaving variables are x_{21} and x_{22} respectively.

(D)the current solution is non optimal and the entering a leaving variables are x_{14} and x_{12} respectively.

Solution:

Given x_{ij} table is :-

6	8	0	0
0	2	14	0
0	0	1	4

Modified cost matrix with u and v values is :-

u/v	v=6	v=4	v=-3	v=-7
u=0	6	4	1	5
u=5	8	9	2	7
u=9	4	3	6	2

Penalities for given solution:

$p_{ij} = u_{ij} + v_{ij} - c_{ij}$
So, table for penalties is :-

0	0	-4	-12
3	0	0	-9
11	10	0	0

As we can see p_{21}, p_{31}, p_{32} are positive.
So, given solution is not optimal.

Entering and leaving variable

x_{ij} table is (P represents positive penalty):-

6	8	0	0
P	2	14	0
P	P	1	4

Only possible loop that can be made is $x_{21}x_{11}x_{12}x_{22}$.
After assigning positive and negative signs to loop elements.

6^-	8^+	0	0
P^+	2^-	14	0
P	P	1	4

Since x_{22} is smallest from all negative assigned values . So option **(C)** is correct .
The current solution is non optimal and the entering and leaving variables are x_{21} and x_{22} respectively.