Assignment

(1) Suggest optimum assignment of 4 workers A, B, C and D to 4 jobs I, II, III & IV. Time taken by different workers in completing the different jobs is given below.

Workers \ Jobs	I	II	III	IV
A	8	10	12	16
B	11	11	15	8
C	9	6	5	14
D	15	14	9	7

Soln:-

0	2	4	8
3	3	7	0
4	1	0	9
8	7	2	0

[0]	1	4	8
3	2	7	[0]
4	[0]	✗	9
8	6	2	✗

IBFS

[0]	1	4	10
1	[0]	5	✗
4	✗	[0]	11
6	4	✗	[0]

$Z_{min} = (8 + 11 + 5 + 7) = 31$

A - I
B - II
C - III
D - IV

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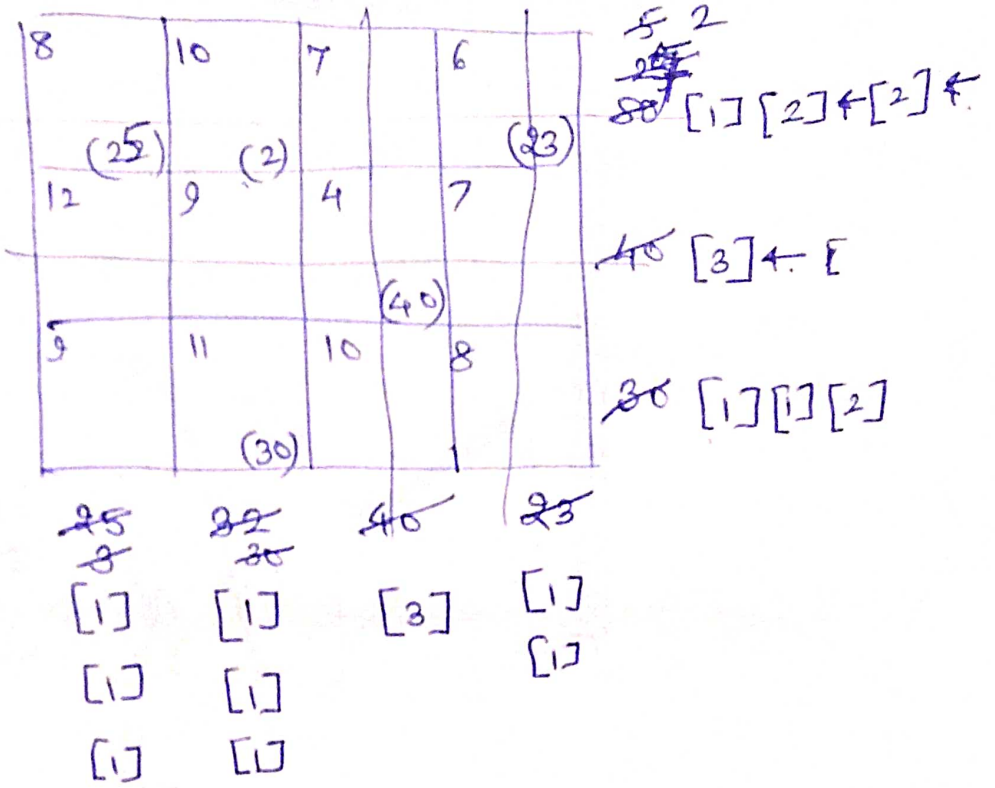
(2) Find the optimum solution for the transportation problem.

Source \ Sink	1	2	3	4	Supply
1	8	10	7	6	50
2	12	9	4	7	40
3	9	11	10	8	30
	25	32	40	23	

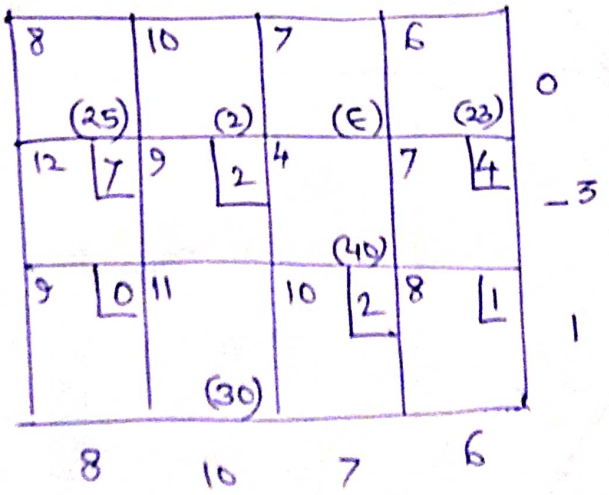


Check for optimality

$m+n-1 = 5$ – T.P. with degeneracy

$(3+4-1=6) \neq 5$

Allocating ϵ $(\epsilon \to 0, \neq 0)$ to cell



As all allocations are ≥ 0, solution is optimum.

T.T.C. = Rs $[(8\times25)+(10\times2)+(6\times23)+(4\times40)+(11\times30)]$

$= 200+20+138+160+330$

$=$ Rs 848

(5) We have five jobs, each of which must go through the two machines A and B in order A B processing times are given as below. Calculate %age utilization of each machine

Job	1	2	3	4	5
Machine A	5	1	9	3	10
Machine B	2	6	7	8	4

2	4	3	5	1

Job	Machine A			Machine B		
	tin	tout	tidle	tin	tout	tidle
2	–	1	–	1	7	01
4	1	4	–	7	15	–
3	4	13	–	15	22	–
5	13	23	–	23	27	01
1	23	28	–	28	30	01

Total elapsed time = 30 mins.

% utilization A = $\frac{30-2}{30} \times 100 = \frac{28}{30} \times 100 = 93.33\%$

B = $\frac{(30-3)}{30} \times 100 = \frac{27}{30} \times 100 = 90.00\%$