56) Travelling Salesmen Problem using Branch & Bound

→ The objective of the TSP is to find a route such that a salesperson visits all the cities and returns back to the same city from where he started the tour with the minimum cost

→ TSP is a minimization problem, here we are supposed to find the lowest bound

→ The lower bound (lb) is denoted as $\left\lceil \frac{S}{2} \right\rceil$

[ceiling]

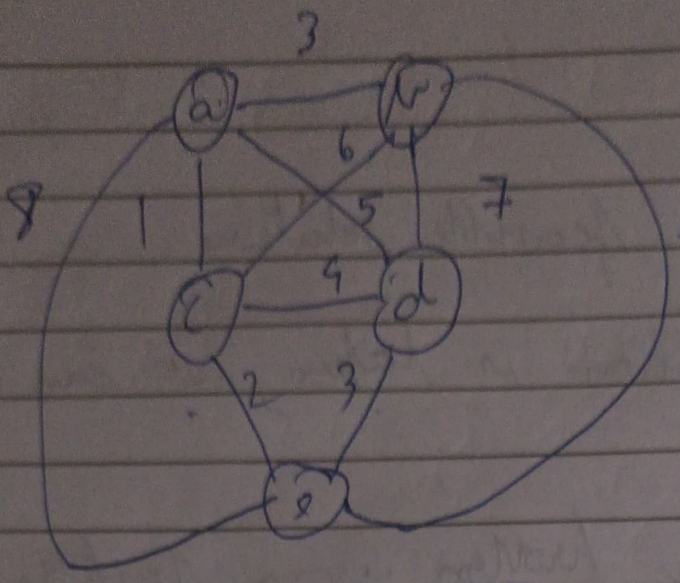
S - is the summation of 2 closest cities of a city for all cities

a b c d e

$$lb = \frac{1+3+3+6+1+2+3+4+2+3}{2}$$

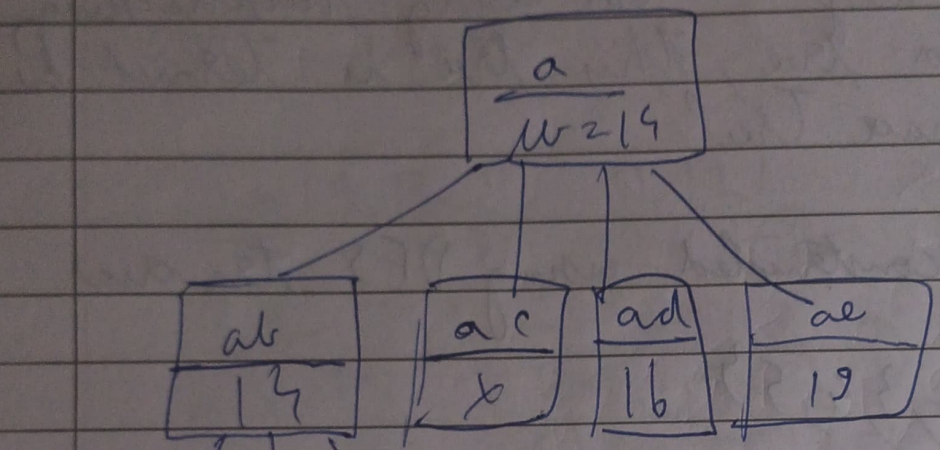
$$= \left\lceil \frac{28}{2} \right\rceil = 14$$

RTO



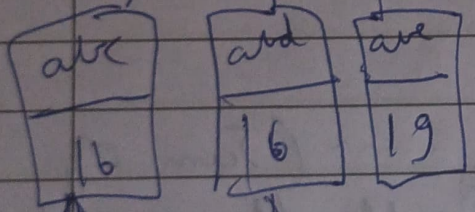
Assumptions

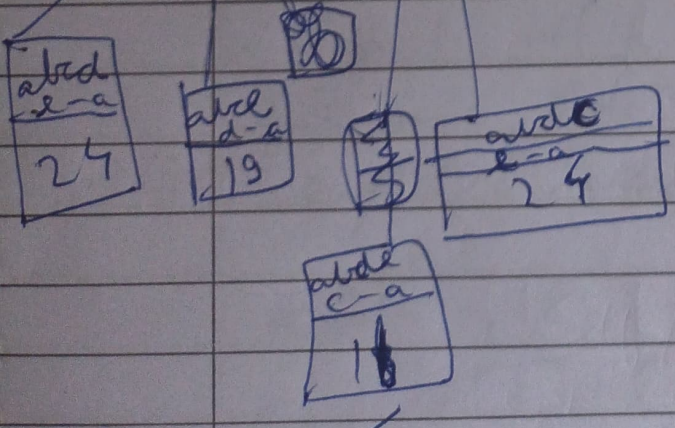
1) a is the starting city
2) City b is visited before visiting c



Final Tour :- a - b - d - e - c - a

Cost :- 3 + 7 + 3 + 2 + 1 = 16





52) Assignment Problem using Branch and Bound

Backtracking	Branch and Bound
1) State Space Tree	1) State Space Tree
2) Feasible Solutions	2) Optimal Solutions
3) DFS Traversal	3) DFS and BFS
4) No Bounding Function	4) Bounding Function

Assignment Problem

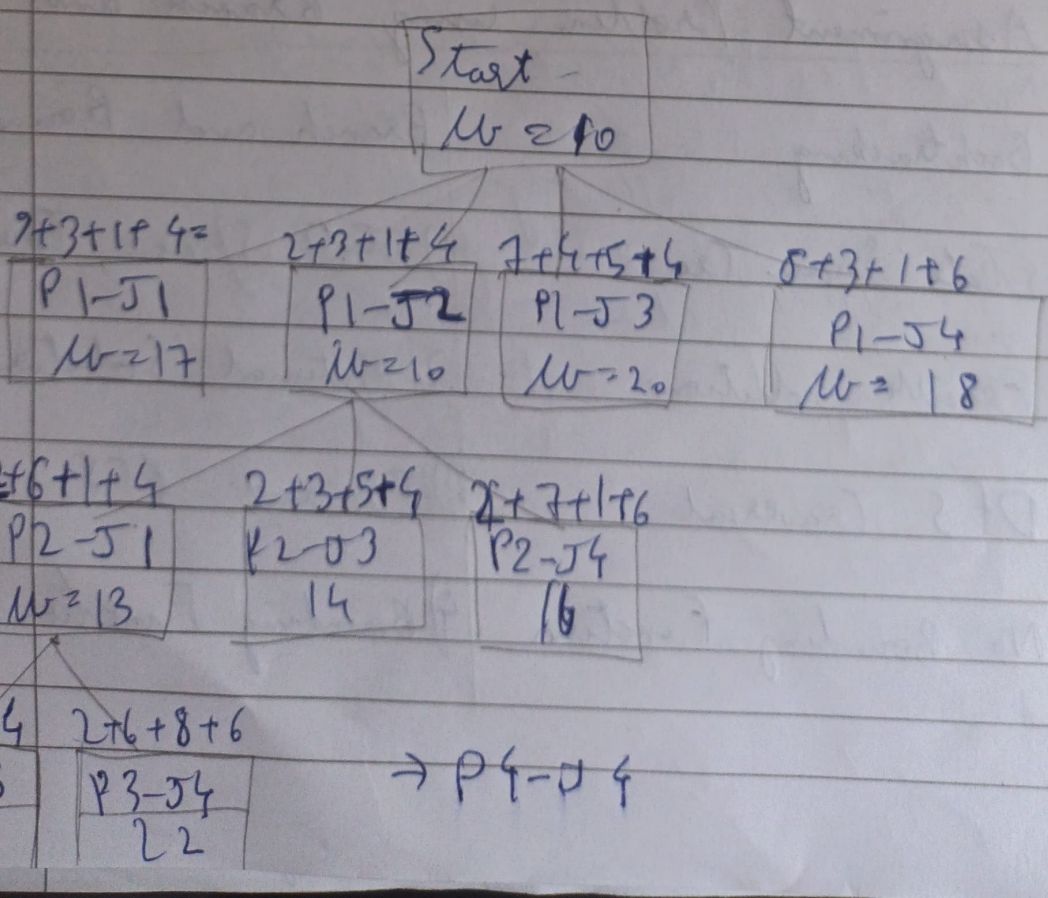
→ The objective of the assignment problem is to assign 'n' jobs to 'n' persons such that the total cost of the assignment is as small as possible.

→ Assignment Problem is a lower bound problem.

→ Lower Bound is calculated as the summation of the lesser / least values in each row

$lb = 2+3+1+4 = 10$

	J_1	J_2	J_3	J_4
P_1	9	2	7	8
P_2	6	4	3	7
P_3	5	8	1	8
P_4	7	6	9	4



$\therefore P_1 - J_2 = 2$

$P_2 - J_1 = 6$

$P_3 - J_3 = 1$

$P_4 - J_4 = 4$

Total cost = 13