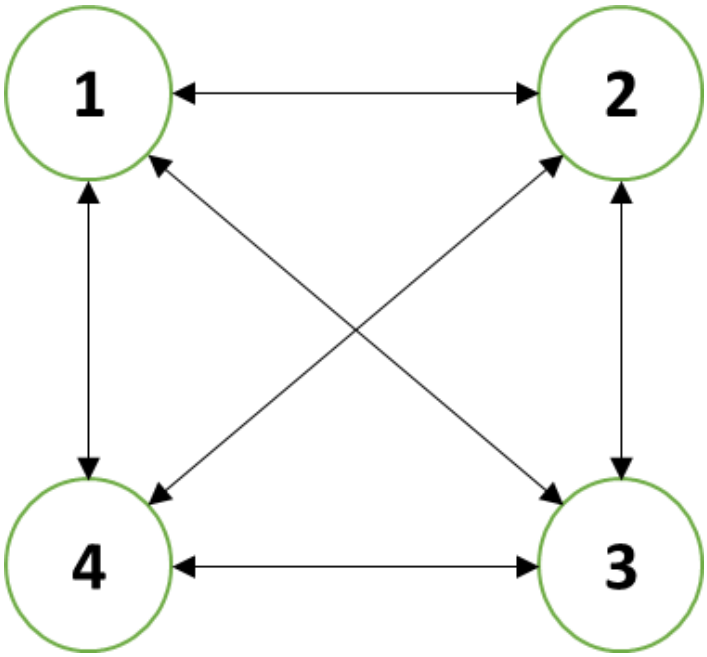
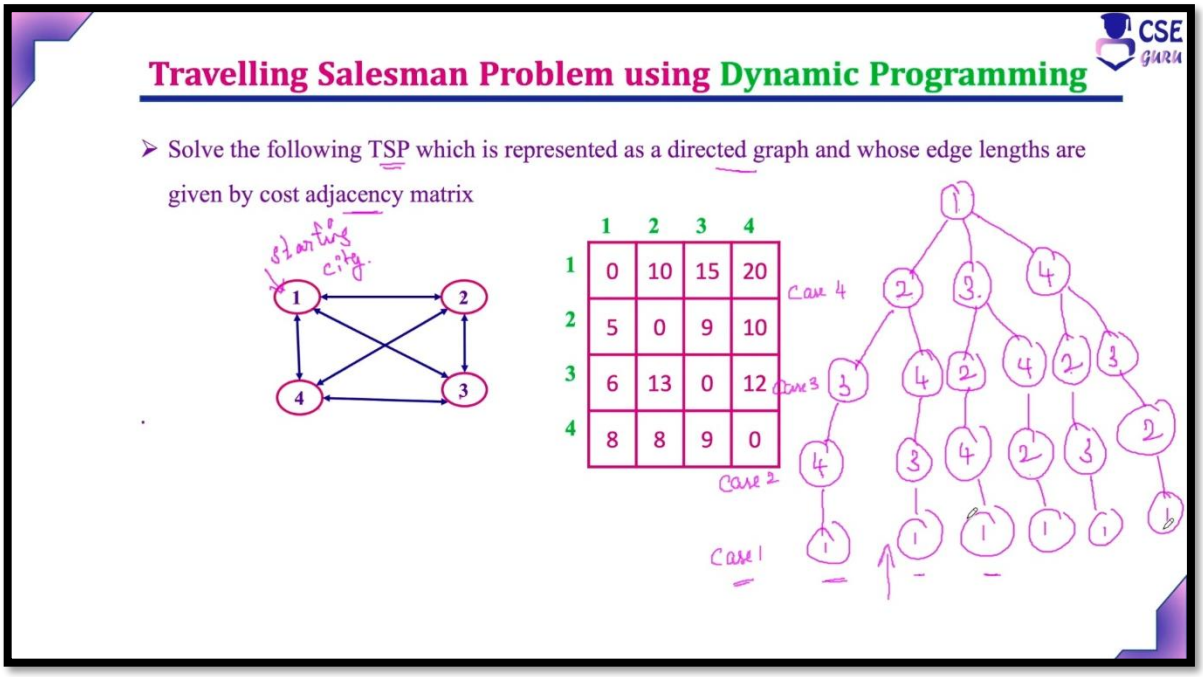
DAA ALM – 3

Solve the following travelling sales person problem using dynamic programming technique.



ANSWERS:



Travelling Salesman Problem using Dynamic Programming Solution

No. of nodes = 4

	1	2	3	4
1	0	10	15	20
2	5	0	9	10
3	6	13	0	12
4	8	8	9	0

Case 1 $S = \phi$

$g(2, \phi, 1) = C_{21} = 5$

$g(3, \phi, 1) = C_{31} = 6$

$g(4, \phi, 1) = C_{41} = 8$

Case 2 $|S| = 1$ $\quad g(i,S) = \min_{j \in S} \{C_{ij} + g(j, S - \{j\})\}$

When $i = 2$:

$g(2, \{3\}) = \min_{j \in \{3\}} \{C_{23} + g(3, \phi)\} = 9 + 6 = 15$

$g(2, \{4\}) = \min_{j \in \{4\}} \{C_{24} + g(4, \phi)\} = 10 + 8 = 18$

When $i = 3$:

$g(3, \{2\}) = \min_{j \in \{2\}} \{C_{32} + g(2, \phi)\} = 13 + 5 = 18$

$g(3, \{4\}) = \min_{j \in \{4\}} \{C_{34} + g(4, \phi)\} = 12 + 8 = 20$

When $i = 4$:

$g(4, \{2\}) = \min_{j \in \{2\}} \{C_{42} + g(2, \phi)\} = 8 + 5 = 13$

$g(4, \{3\}) = \min_{j \in \{3\}} \{C_{43} + g(3, \phi)\} = 9 + 6 = 15$

Travelling Salesman Problem using Dynamic Programming Solution

Case 3 $|S| = 2$ $\quad g(i,S) = \min_{j \in S} \{C_{ij} + g(j, S - \{j\})\}$

When $i = 2$:

$g(2, \{3,4\}) = \min_{j \in \{3,4\}} \{C_{23} + g(3,4),\ C_{24} + g(4,3)\}$

$= \min\{9 + 20,\ 10 + 15\}$

$= \min\{29, 25\} = 25$

When $i = 3$:

$g(3, \{2,4\}) = \min_{j \in \{2,4\}} \{C_{32} + g(2,4),\ C_{34} + g(4,2)\}$

$= \min\{13 + 18,\ 12 + 13\}$

$= \min\{31, 25\} = 25$

When $i = 4$:

$g(4, \{2,3\}) = \min_{j \in \{2,3\}} \{C_{42} + g(2,3),\ C_{43} + g(3,2)\}$

$= \min\{8 + 15,\ 9 + 18\}$

$= \min\{23, 27\} = 23$

	1	2	3	4
1	0	10	15	20
2	5	0	9	10
3	6	13	0	12
4	8	8	9	0

Case 1

$g(2, \phi, 1) = 5$

$g(3, \phi, 1) = 6$

$g(4, \phi, 1) = 8$

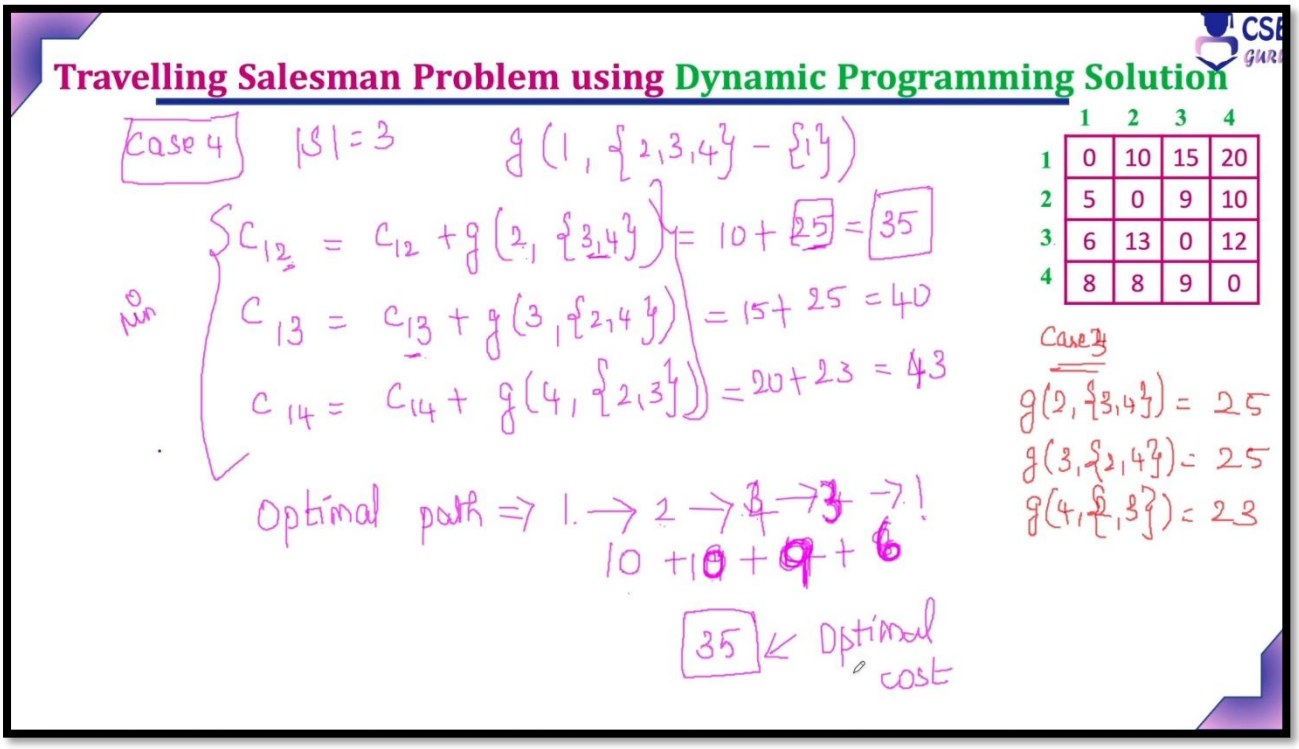
Case 2

$g(2, \{3\}) = 15$ $\quad g(4, \{2\}) = 13$

$g(2, \{4\}) = 18$ $\quad g(4, \{3\}) = 15$

$g(3, \{2\}) = 18$

$g(3, \{4\}) = 20$



ANSWERE LINK https://youtu.be/iB-UGKyTBOc?si=c_RZP-sgFB49RkV1