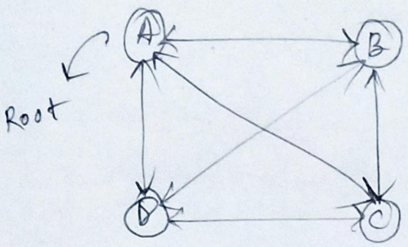
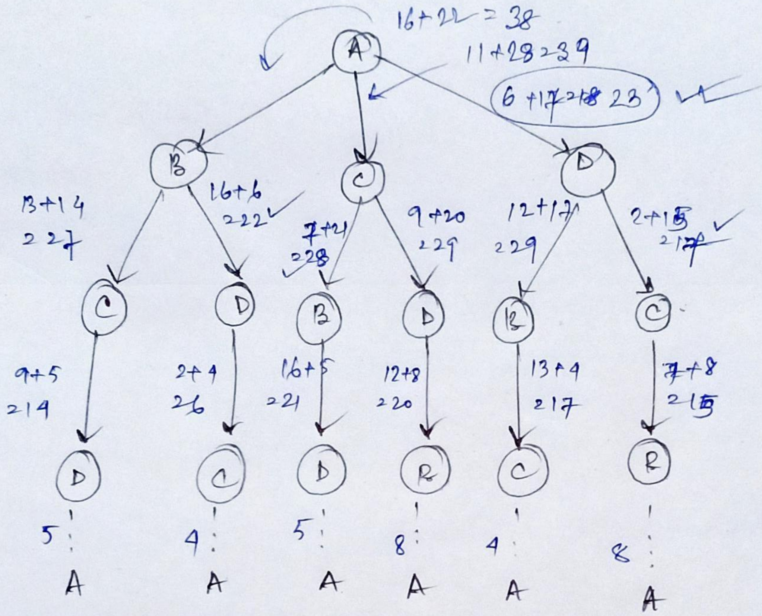
(III) Travelling Salesman Problem  # Time complexity = $O(2^n)$




| | A | B | C | D |
|---|---|---|---|---|
| A | 0 | 16 | 11 | 6 |
| B | 8 | 0 | 13 | 16 |
| C | 4 | 7 | 0 | 9 |
| D | 5 | 12 | 2 | 0 |




$$\boxed{g(i, S) = \min[w(i,j) + g(j, \{S - j\})]}$$

i → starting vertex

S → set of vertices which will be visited only once.

Route:

$\boxed{A \to D \to C \to B} = 23$.

$g(A, \{B,C,D\}) = \min [w(A,B) + g(B, \{C,D\})] = 16 + 22 = 38$

$[w(A,C) + g(C, \{B,D\})] = 11 + 28 = 39$

$[w(A,D) + g(D, \{B,C\})] = 6 + 17 = 23$

$g(B, \{C,D\}) = \min[w(B,C) + g(C,D)] = 13+14 = 27$

$[w(B,D) + g(D,C)] = 16+6 = 22$

$g(C, \{B,D\}) = \min [w(C,B) + g(B,D)] = 7+21 = 28$

$[w(C,D) + g(D,B)] = 9+20 = 29$

$g(D, \{B,C\}) = \min [w(D,B) + g(B,C)] = 12+17 = 29$

$[w(D,C) + g(C,B)] = 2+15 = 17$

$g(C,D) = w(C,D) + g(D, \phi) = 9+5 = 14$

$g(D,C) = w(D,C) + g(C,\phi) = 2+4 = 6$

$g(B,D) = w(B,D) + g(D,\phi) = 16+5 = 21$

$g(D,B) = w(D,B) + g(B,\phi) = 12+8 = 20$

$g(B,C) = w(B,C) + g(C,\phi) = 13+4 = 17$

$g(C,B) = w(C,B) + g(B,\phi) = 7+8 = 15$