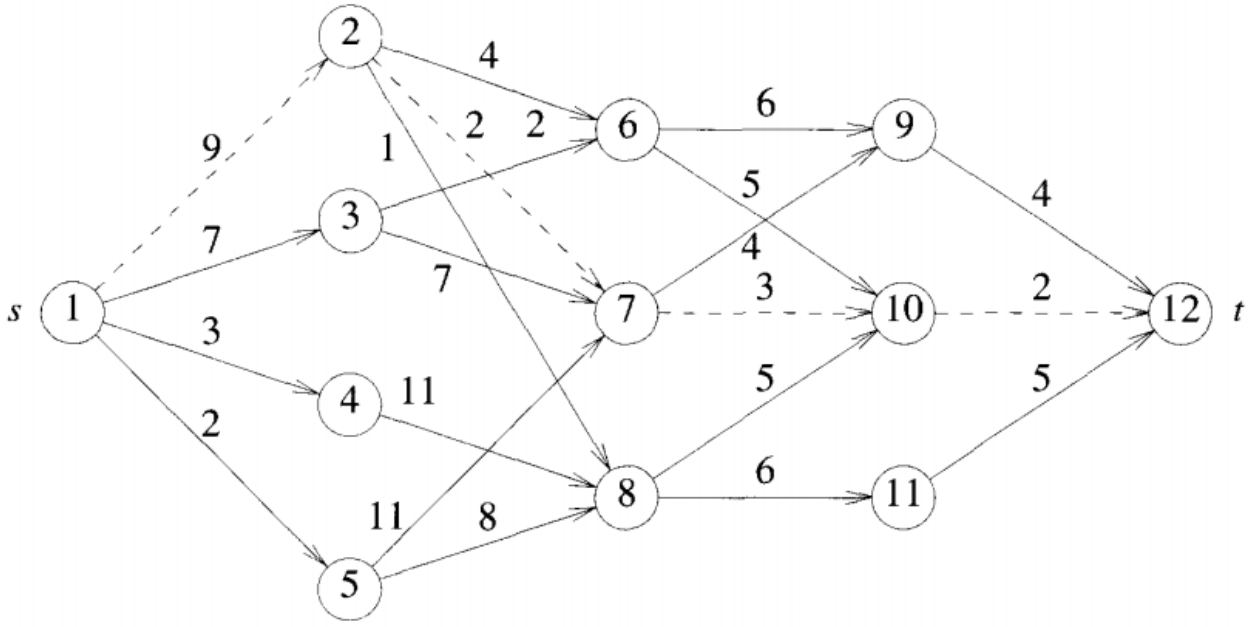
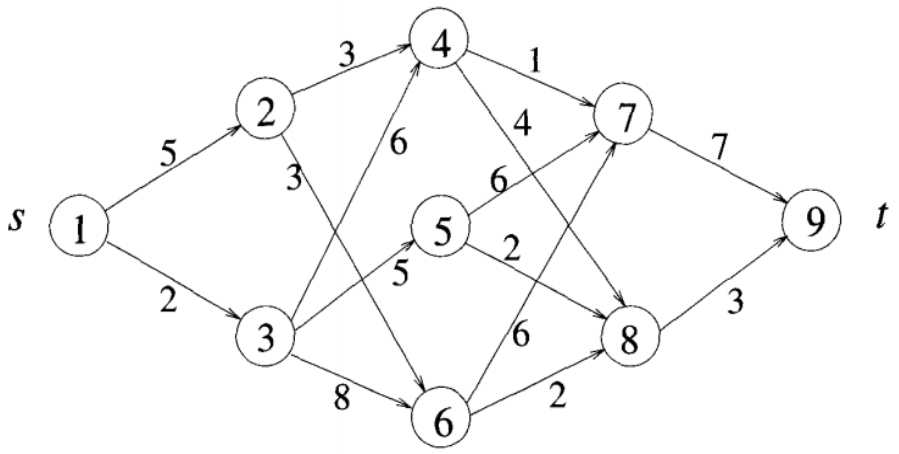
Computer Algorithm

Tutorial No.- 4 Unit III

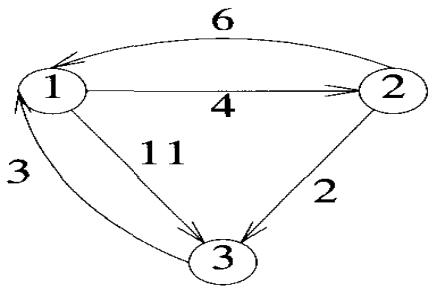
1. Write note on "Dynamic programming approach"
2. Explain multistage graph problem and its use in resource allocation problem.
   What is multistage graph? Explain any one application of multistage graph
   Explain dynamic programming solution to multistage graph problem.
3. Write the expressions used for computation of minimum cost path in multistage graph with both approaches.
4. Solve the multistage graph problem using dynamic programming approach.
   Find shortest path from s to t using dynamic programming approach.



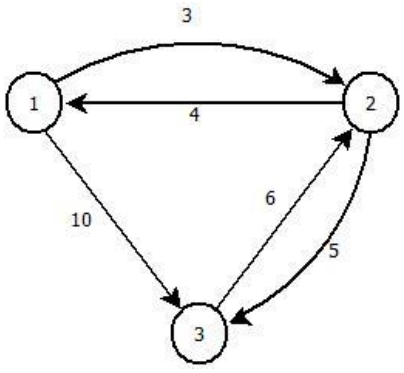
5. Solve the multistage graph problem using dynamic programming approach to find shortest path from s to t.



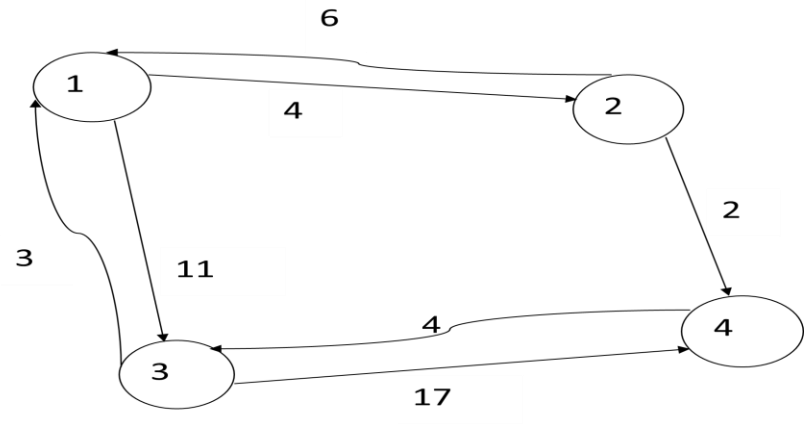
6. Explain solution to all pairs shortest path problem using dynamic programming Explain all pair shortest path algorithm with example
7. Solve the following all pairs shortest path problem to obtain matrix representing all pairs shortest path.



8. Solve the following instance of all pairs shortest path problem to obtain matrix representing all pairs shortest path.



9. Solve the following all pairs shortest path problem to obtain matrix representing all pairs shortest path.



10. Explain solution to optimal binary search tree's problem using dynamic programming

    Write note on "optimal binary search tree"

11. Derive an expression for cost of optimal binary search tree

12. Draw an optimal binary search tree where nodes are labeled as (do, if, while) and the events of successful and unsuccessful search are equi-probable.

13. Draw an optimal binary search tree where nodes are labeled as (do, if, while) and probabilities for successful and unsuccessful search are

    p(1)=0.5, p(2)=0.1, p(3)=0.05 and q(0)=0.15, q(1)=0.1, q(2)=0.05, q(3)=0.05

14. Using dynamic programming approach find the solution for following instance of optimal binary search tree problem. The set of identifiers are (a_1, a_2, a_3, a_4) = (count, float, if, while) with p(1:4)=(3, 3, 1, 1), q(0:4)=(2, 3, 1, 1, 1). pi's and qi's are multiplied by 16 for convenience. Using r(i, j)'s construct OBST

15. Using dynamic programming approach find the solution for following instance of optimal binary search tree problem. The set of identifiers are (a_1, a_2, a_3, a_4) = (count, float, if, while) with p_1=1/20, p_2=1/5, p_3=1/10, p_4=1/20, q_0=1/5, q_1=1/10, q_2=1/5, q_3=1/20, q_4=1/20. Using r(i, j)'s construct OBST

16. Explain dynamic programming solution to 0/1 Knapsack problem.

17. Solve the instance of 0/1 knapsack problem using n=4. (w1, w2, w3, w4)=(10, 15, 6, 9) and (p1, p2, p3, p4)=(2, 5, 8, 1) and capacity of knapsack is 25.

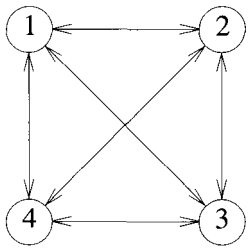
18. Solve the instance of 0/1 knapsack problem using n=3. (w1, w2, w3)=(2, 3, 4) and (p1, p2, p3)=(1, 2, 5) and m=6
19. Explain reliability design problem with example

    Write note on "Reliability Design"
20. Solve the following instance of reliability design problem with 3 stages. Cost of the system is 105. Cost of device in stage 1 is 30, stage 2 is 15 and stage 3 is 20. Reliabilities for 3 stages are 0.9, 0.8 and 0.5 respectively. Number of devices available in stage 1 are 2, stage 2 are 3 and stage 3 are 3.

21. Solve the following instance of reliability design problem with 3 stages. Cost of the system is 175. Cost of device in stage 1 is 40, stage 2 is 25 and stage 3 is 35. Reliabilities for 3 stages are 0.75, 0.85 and 0.6 respectively. Number of devices available in stage 1 are 3, stage 2 are 3 and stage 3 are 2.

22. Solve the instance of "Travelling sales persons problem" to find tour of minimum cost

Directed Graph



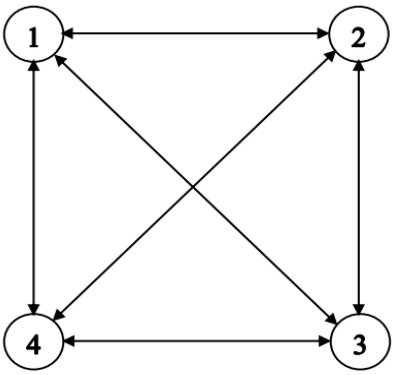
(a)

Edge Length- adjacency matrix

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(b)

23. Solve the following instance of Travelling Sales-person problem (TSP) using Dynamic Programming Approach to find tour of minimum cost.



Directed Graph

$$\begin{bmatrix} 0 & 9 & 18 & 10 \\ 13 & 0 & 14 & 17 \\ 12 & 13 & 0 & 16 \\ 11 & 12 & 16 & 0 \end{bmatrix}$$

Adjacency Matrix with Edge Length

24. Write note on "Travelling sales persons problem"

    Explain dynamic solution to travelling sales person's problem

25. Explain dynamic solution to flow shop scheduling.

    Write note on "Flow shop scheduling"