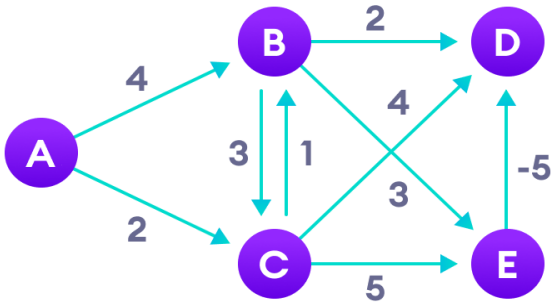
1. Using the Bellman-Ford algorithm, find the shortest path from source node 'A' and write an algorithm for the same:

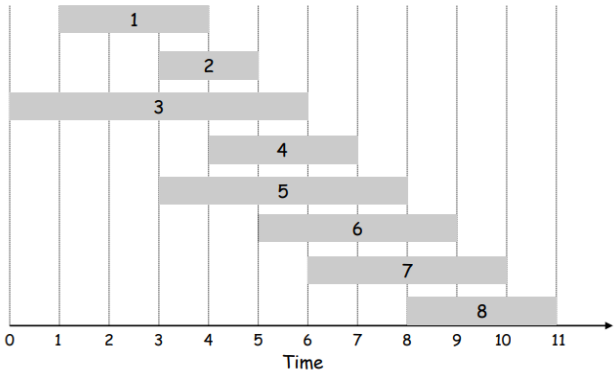


2. Find the knapsack problem for the given input data with W = 11 and write an algorithm for the same:

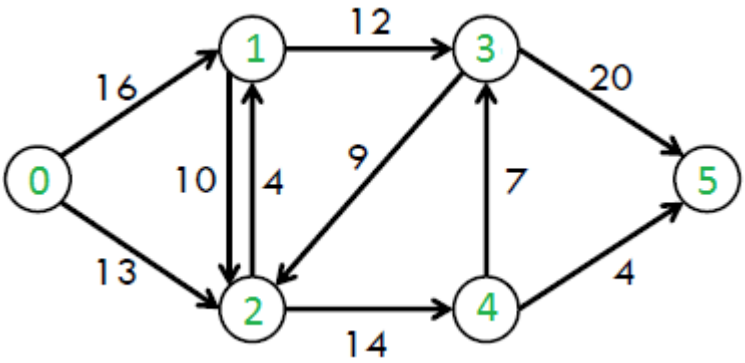
Item	Value	Weight
1	1	1
2	6	2
3	18	5
4	22	6
5	28	7

3. Explain the analysis of survey design problem in detail.

4. Find the weighted interval scheduling problem using dynamic approach:
$W_1 = 3$, $W_2 = 2$, $W_3 = 4$, $W_4 = 1$, $W_5 = 2$, $W_6 = 5$, $W_7 = 2$, $W_8 = 1$



5. Find the Maximum Flow problem for the given graph where source node is '0' and sink node is '5' using Ford-Fulkerson algorithm and write an algorithm for the same:



6. Prove that "Greedy algorithm for interval scheduling returns an optimal set A".

7. Construct the optimal prefix code for S={a,b,c,d,e,f} and frequencies f_a=0.25, f_b=0.30, f_c=0.15, f_d=0.15, f_e=0.08, f_f=0.07. Find the average code word length.

8. Discuss Kruskal's algorithm to find the minimum spanning tree. Apply the same for the following graph.

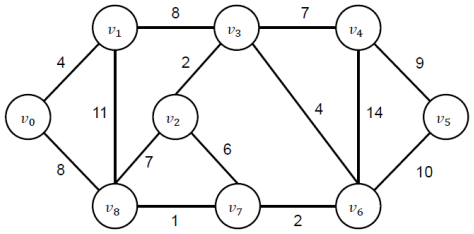


Fig.5(c)

9. Write the greedy algorithm for Interval Scheduling for minimizing the maximum lateness. Explain the running time of the algorithm.

10. Prove that the"Prim's Algorithm produces a minimum spanning tree for the given graph G".

11. Construct single source shortest path for the following graph with "A" as the source vertex. Using Dijkstra's algorithm.

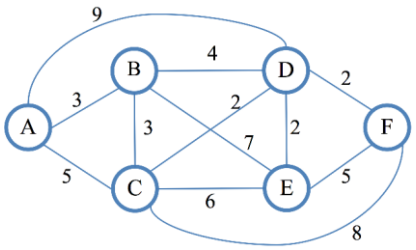


Fig.6(c)

12. Design a memoization procedure to determine the maximum weight for a given set of n intervals, and each interval having a weight w.

13.Discuss an algorithm to find the shortest path for a given graph G using Bellman Ford algorithm. Explain how it is different from Dijkstra's algorithm.

Apply the Ford Fulkerson algorithm to find the maximum flow path from **S** to **T** in the given flow network.

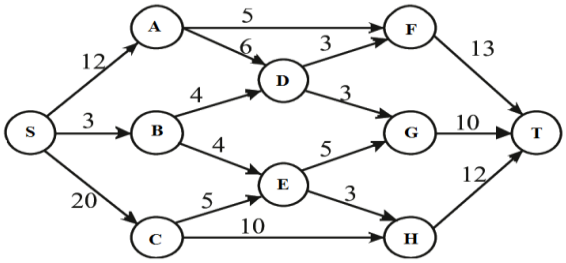


Fig.7(c)

14.Write the algorithm for Subset Sum problem. Discuss the recurrence relation used in the algorithm.

15.Explain the airline scheduling algorithm.

16.Calculate the maximum value for the following problem by using knapsack algorithm with capacity W=10.

Item	Weight	Value
1	3	100
2	2	20
3	4	60
4	1	40

17. Find all the Hamiltonian Paths in the given graph.

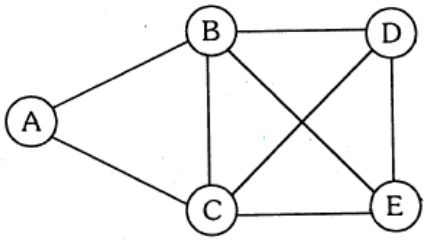


Fig.9(a)

18. Explain the general strategy to prove the given problems as NP-Complete problems.

19. Explain Vertex cover and Independent set problem with an example. Construct a proof to determine that both of the problems are NP-Complete.

20. Prove that Hamiltonian Path is NP-Complete.

21. Define P, NP, NP-Complete & NP-Hard problems. Give examples.

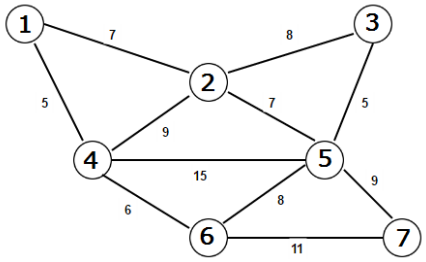
22. Explain how the Circuit Satisfiability is a NP-Complete problem.

23. Prove that "Greedy algorithm for interval scheduling returns an optimal set A".

24. Apply the Minimizing the Maximum Lateness approach for the following set of intervals.

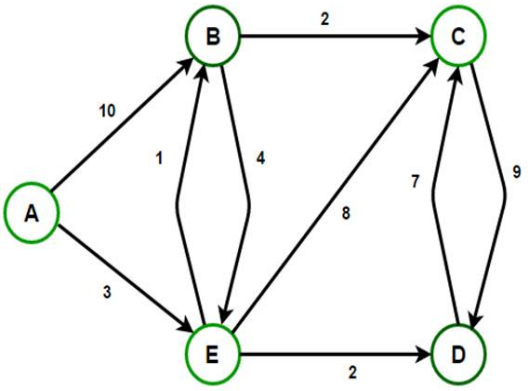
	1	**2**	**3**	**4**	**5**	**6**
tj	5	3	2	4	5	1
dj	10	6	3	18	14	16

25. What is a minimum cost spanning tree? Find the minimum spanning tree for the following graph using Prim's algorithm.



26.State the Kruskal's algorithm to find the minimum spanning tree. List the merits of kruskal over prim's algorithm.

27.Apply the single source shortest path algorithm for the following graph. Consider "A" as the source vertex.



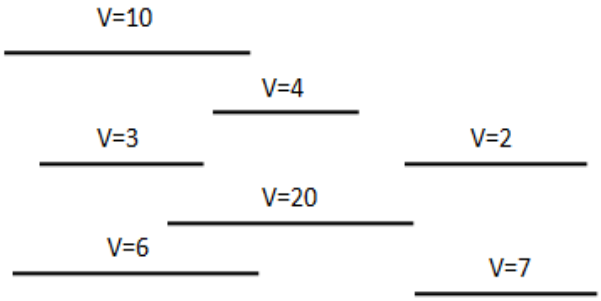
28. Construct the Huffman tree for the following symbols. Find the code words and average code word length.

Symbol	A	B	C	D	E	F	G

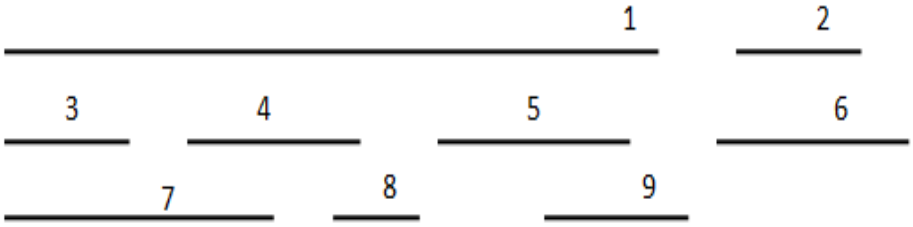
Frequency	0.25	0.15	0.8	0.7	0.10	0.15	0.20

Encode the following String:
CEGADFBEA

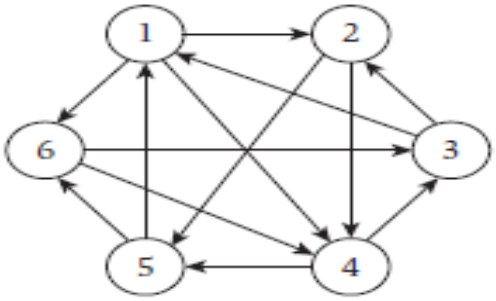
29. Identify the optimal set of intervals with maximum value for the following intervals, using dynamic programming approach.



30. Describe an algorithm to determine the set of items in the knapsack with maximum profit that can be obtained using dynamic programming.
31. Define Dynamic programming and its principles.
32. Describe an algorithm to determine the maximum flow for a given directed graph G=(V,E).
33. Identify the optimal set of intervals using weighted interval scheduling algorithm with (v1,v2,v3,v4,v5,v6,v7,v8,v9)= (3,4,5,6,7,2,3,4,5), using dynamic programming approach.



34. Identify the items in the knapsack that can be placed given the following items and their properties with knapsack capacity as 12.
(w1,w2,w3,w4)=(4,8,4,2) (p1,p2,p3,p4)=(10,20,30,40)
35. Explain the general strategy to prove NP-Complete problems?
36. Describe polynomial time reduction? Construct a proof for the following.
Suppose X is an NP-complete problem. Then X is solvable in polynomial time if and only if P = NP.
37. Formulate travelling salesman problem and prove its NP-completeness.
38. Describe polynomial time reduction? Construct a proof for the following.
If Y is an NP-complete problem, and X is a problem in NP with the property that Y ≤P X, then X is NP-complete.
39. Define NP complete problems and construct a proof for "Is there a problem in NP that does not belong to P? Does P = NP?"
40. Identify **Hamiltonian** cycle for the following graph.



41. Explain the general strategy to prove that problems are NP-Complete.
42. Describe polynomial time reduction? Prove “If Y is an NP-complete problem, and X is a problem in NP with the property that Y ≤P X, then X is NP-complete.”
43. Explain how Circuit Satisfiability problem is a NP-Complete problem.
44. Explain with an example P, NP, NP-Complete & NP-Hard problems.
45. Describe polynomial time reduction? Construct a proof for the following - “Suppose X is an NP-complete problem. Then X is solvable in polynomial time if and only if P = NP.”
46. Find all Hamiltonian Paths in the given graph. Prove that Hamiltonian Path is NP-Complete.