Siliguri Institute of Technology

Computer Science & Engineering Department
Year: 2nd Semester: 2nd Section: A
Marks: 50

Paper Name: Design & Analysis of Algorithm
Paper Code: PCC-CS404
Submission Date: 16th March, 2023
Assignment policy:

- Assignments must be submitted **in class** as hardcopy (A4 sheet) on the due date mentioned in the assignment
- Early submissions are allowed.
- All assignments must be done individually. Anyone cheating will receive a zero for that assignment.
- Late submission policy: **No late submissions will be allowed** on any assignment. However, earlier submissions are allowed at any time before due.

Assignment – I

1. What is the time complexity for the following set of instructions

```
for i = 1 to n do {
for j= 1 to n-1 do {
if( A[j] > A[j+1]) then
swap( A[j] , A[j+1])
}
}
```

2. Modify Binary search algorithm so that it divides the sorted array into three equal parts instead of two. In each iteration, the algorithm must test the element k to be searched for against two entries in the array. Analyses the time complexity of the algorithm.

3. Consider the Merge Sort algorithm first divides the input array A [low.....high] of n elements into four parts A1, A2, A3 and A4 instead of two. If then sorts each sub array recursively, and finally merges these four sorted parts to obtain the original array in sorted order.
   [Assume n is a power of 4]

   i. Write the modified algorithm.
   ii. Analyses its running time complexity.

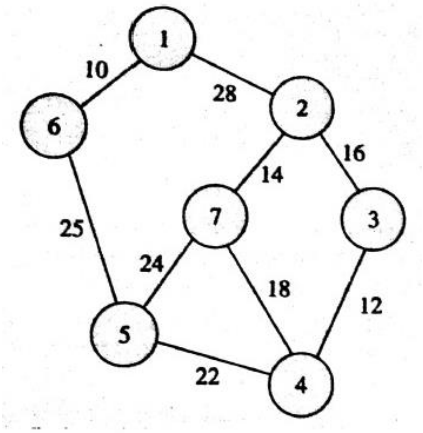
4. What is the running time of Quick Sort when elements of array A have same value?

5. Create a Max/Min Heap with the following key elements.

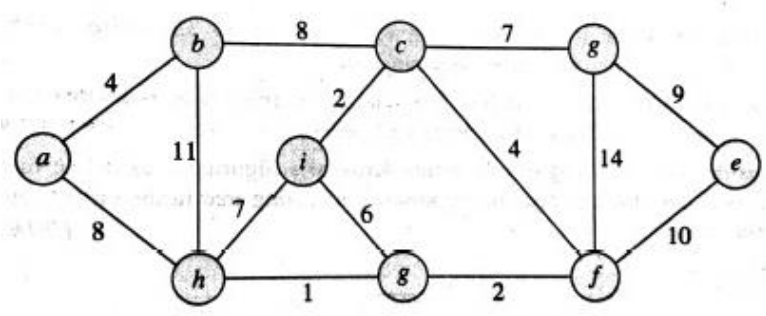
   7,17,3,16,15,11,13,10,1,5

6. Given the weight vector (2,3,5,7,1,4,1) and the profit vector (10,5,15,7,6,8,18) and a knapsack of capacity 15. Find the optimal profit using Greedy Knapsack algorithm.

7. Find the minimum spanning tree for the following graph using Prim's Algorithm.



8. Find the minimum spanning tree for the following graph using Kruskal's Algorithm.



9. Find the optimal profit using Greedy Job Sequencing with Deadline algorithm.

Jobs	J1	J2	J3	J4	J5	J6	J7
Profits	35	30	25	20	15	12	5
Deadlines	3	4	4	2	3	1	2

Siliguri Institute of Technology

Computer Science & Engineering Department
Year: 2nd Semester: 2nd Section: A
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Paper Name: Design & Analysis of Algorithm
Paper Code: PCC-CS404
Submission Date: 20th May, 2023
Assignment policy:

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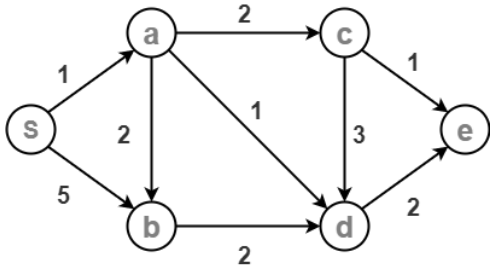
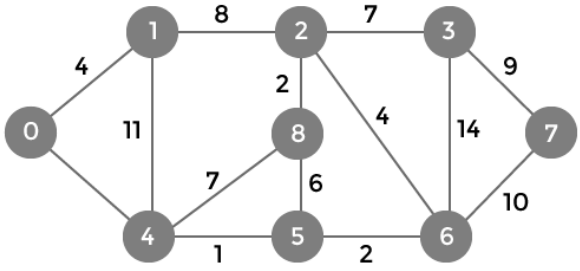
Assignment – II

1. Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is **<5, 10, 3, 12, 5>.**

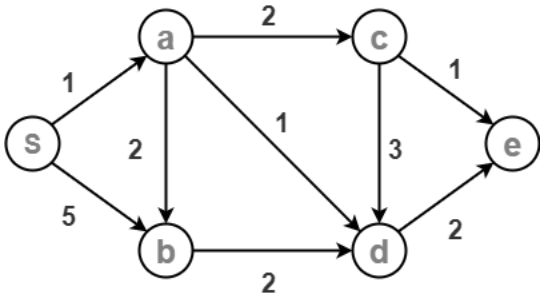
2. For the graph shown below find the following.
   - Adjacency list Representation
   - Adjacency matrix representation.



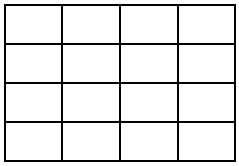
3. Find out the shortest path from '0' to '7' using Dijkstra's Algorithm

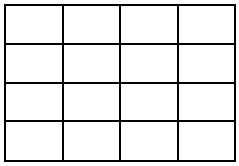


4. Find out the Chromatic Number for the following Graph.

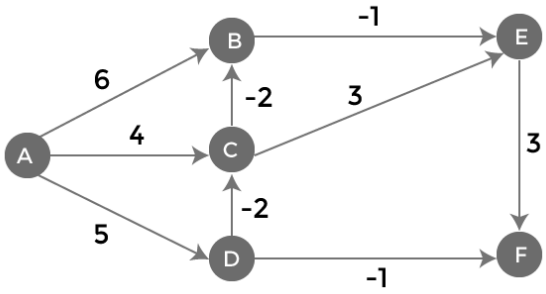


5. Find two solution set for the 4_Queen Problem.

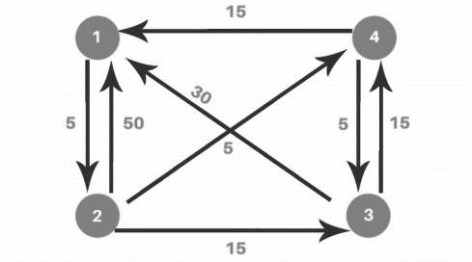




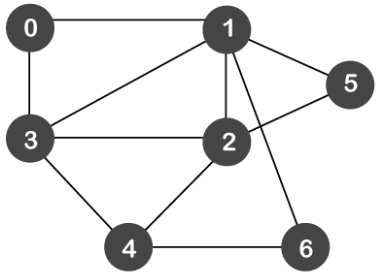
6. Find out the shortest path from 'A' to 'E' (if possible) using Bellman-Ford Algorithm



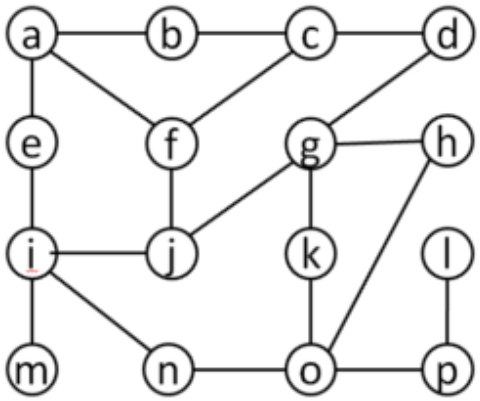
7. Find out the all pair shortest path using Floyd's Algorithm.



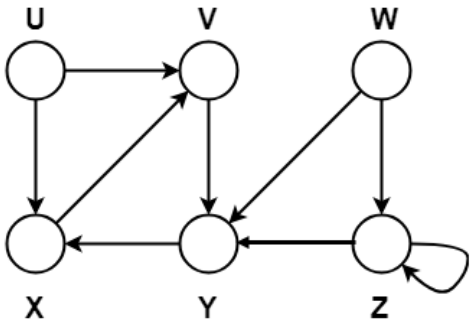
8. Find out the BFS and DFS Tree for the following undirected Graph.



9. Find out the BFS and DFS Tree for the following undirected Graph.



10. Find out the BFS Tree, DFS Tree and also classify all the edges for the following Graph.



11. Write the max-flow min-cut Theorem.

12. Use the Ford-Fulkerson Algorithm to find the maximum flow.