U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 19CS4PCADA **Max Marks: 100**
Course: Analysis and Design of Algorithms

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

UNIT - I

1 a) Derive the time complexity of linear search for best and worst case. **5**

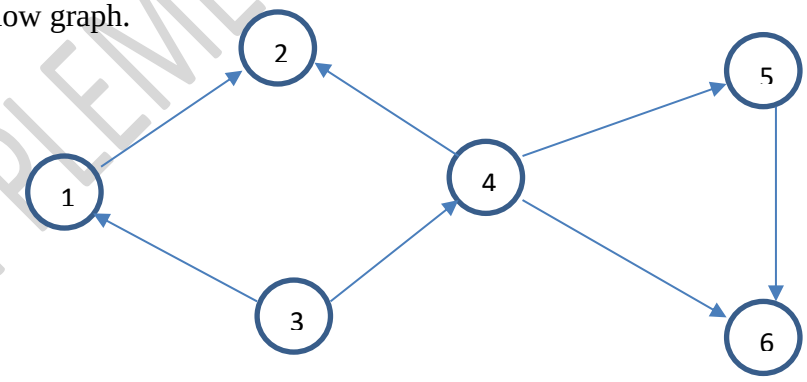
b) Design recursive algorithm for solving the Tower of Hanoi problem. Also, derive its time complexity. **8**

c) Describe algorithm design and analysis process with necessary diagram. **7**

UNIT - II

2 a) Design selection sort algorithm. Derive its time complexity. Also apply the same to sort below numbers.5,3,1,2,8,6 **10**

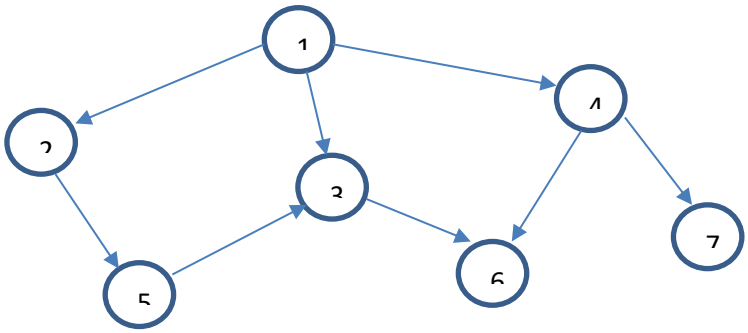
b) Apply source removal method to find topological order of vertices for the below graph. **5**



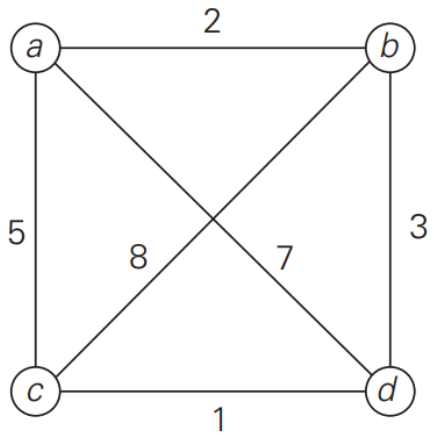
c) Design Brute force string matching algorithm. Find the number of comparisons required to search for **"ERP"** in **"EEEERP"** using same. **5**

OR

3 a) Design a recursive algorithm for DFS. Apply the same on the below graph to find the order of traversal. Start from node 1. **10**



b) Apply exhaustive search to solve the below travelling salesman problem. **4**



c) Describe different variants of Decrease and Conquer with an example for each. **6**

UNIT - III

4 a) Design an algorithm for merge sort. Apply the same to sort below numbers. **10**
5, 1, 3, 6, 8, 4, 2, 7

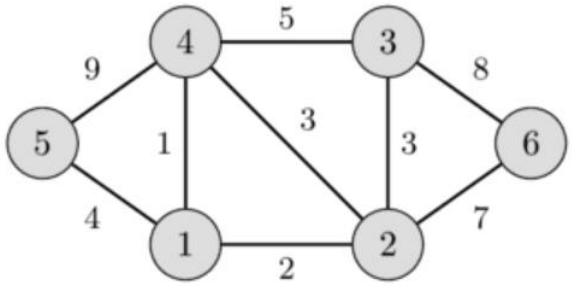
b) Create max heap for the below list of numbers. **10**
11, 5, 18, 6, 32, 9, 17
Also sort them using Heap sort.

UNIT - IV

5 a) Apply Dynamic programming technique to solve the below 0/1 knapsack problem. **5**
Capacity of knapsack=5

Item no.	Weight	value
1	2	12
2	1	10
3	3	20
4	2	15

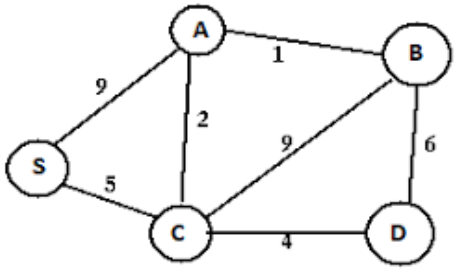
b) Design Prim's algorithm for finding minimum spanning tree. Apply the same for the below graph to find minimum spanning tree. **10**



c) Write Warshall's algorithm. Also derive its time complexity. **5**

OR

6 a) Design a Greedy algorithm for finding single source shortest paths. Apply the same on the below graph to find shortest paths from S to all other nodes. **10**

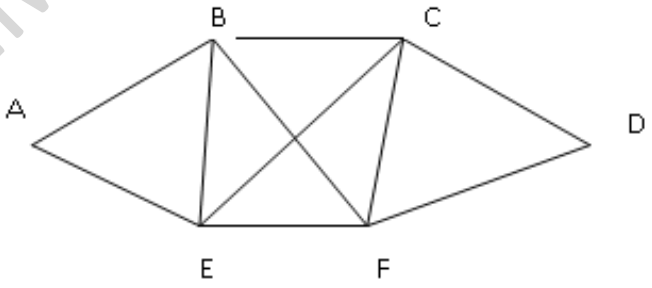


b) Compare dynamic programming technique with a design technique that uses only recursion. Give an example. **5**

c) Design an algorithm to find all pair shortest paths in a graph. **5**

UNIT - V

7 a) Define Clique of a graph. Find the maximum clique in the below graph. **5**



b) Apply backtracking approach to write state space tree for 4 Queen's problem. **10**

c) Convert the below 3 CNF to clique problem and find solution for 3CNF. **5**

(~x1 V x2 V x3) ^ (x1 V~ x2 V~ x3) ^ (x1 V x2 V x3)

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