# 8389

## B.Tech. VIth Semester Examination, 2024

## DESIGN AND ANALYSIS OF ALGORITHM

### Paper : CS–601

*Time : 3 Hours* ] [ *M.M. : 70*

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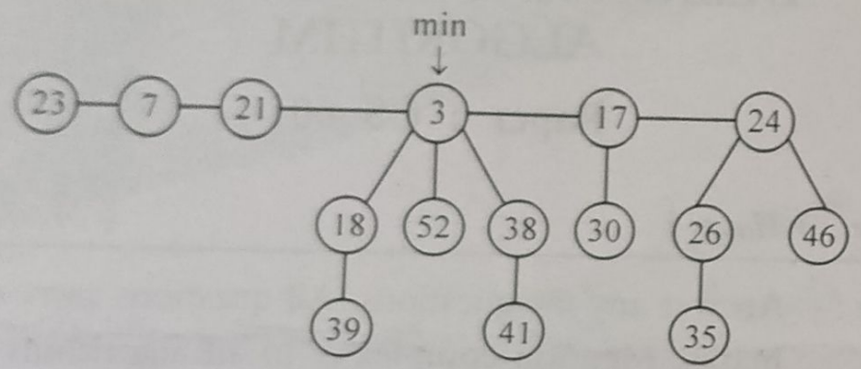
*Note* :– Answer any *five* questions. All questions carry equal marks. Mention complexity in all algorithms even if it is not.

1. Write down the algorithm of quick sort and mention its complexities for best case, worst case and average case. Apply the quick sort technique on the following list of integer arrayA[8] = {14, 15, 11, 27, 88, 9}. [14]
2. Write down the algorithm of insertion sort algorithm and mention its complexities for best case, worst case and average case. Apply the insertion sort technique to the following list of integer arrayA [6] = {11, 5, 1, 4, 77, 6} [14]

3. Write down the properties of B-tree. Insert the following information K, S, Q, R, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E, G, I into an empty B-tree with degree t = 3. [14]

4. Write algorithm for Fibonacci heap extract min operation. Apply Fibonacci heap extract min algorithm showing all the steps to the given Fibonacci heap (figure : A shown below) [14]




Fibonacci Heap

**Fig. A**

5. Discuss Prim algorithm and write their Pseudo codes. For the graph shown below obtain the following (Figure : B shown below ) [14]

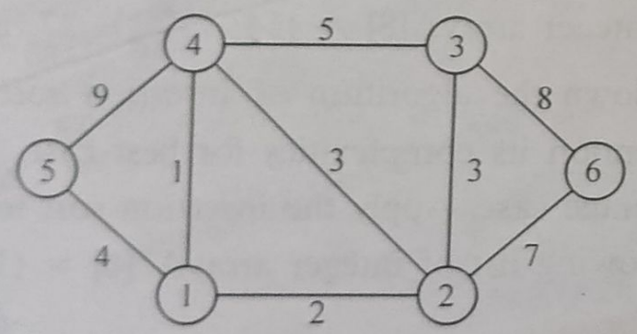



**Fig. B**



6. Write down Pseudo codes of BELLMAN-FORD algorithms. Find shortest path using BELLMANFORD algorithm from point S to point T of the following figure C : [14]

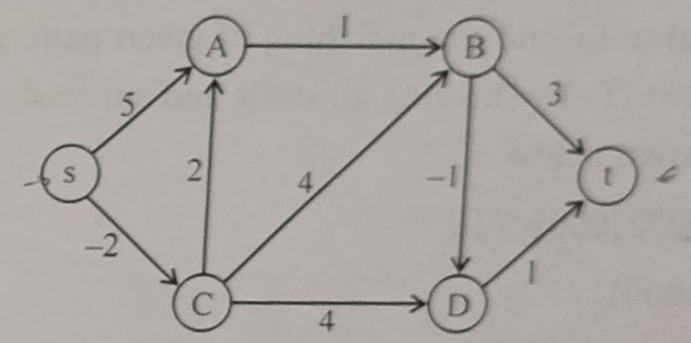



**Fig. C**

7. What is the sum of subsets problem ? Let individual weights are w = {5, 7, 10, 12, 15, 18, 20} and sum allowed is m = 35. Find all possible subsets of w that sum to given value of m using recursive the state-space tree that is generated backtracking algorithm for it. [14]

8. Mention N-Queen's problem. Examine 4 Queen's problem using back tracking method. Write down complete state space representation for the solution of 4-Queen problem showing all possible solutions and non-solutions. [14]

9. Discuss in detail about the NP problem. NP hard problems and NP complete problems using suitable examples for each of them. [14]

10. Write down the Naive String-Matching algorithm and mention its time complexity. Use Naive String-Matching algorithm to find the matching of given pattern (P) into the Text (T) by showing all shifts and successful matches as shown below :

T : 0000100010010

P : 10001 [14]