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B. TECH.
(SEM V) THEORY EXAMINATION 2021-22
DESIGN & ANALYSIS OF ALGORITHM

Time: 3 Hours**Total Marks: 70****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A**

- 1. Attempt all questions in brief.** **2 x 7 = 14**
- Explain Big O notation in brief.
 - Write an Insertion sort algorithm.
 - Write the properties of B-Trees.
 - How insert a node in skip list?
 - How Backtracking approach is different from branch & bound approach?
 - Explain the elements of Dynamic programming.
 - What is NP-Hard problem?

SECTION B

- 2. Attempt any three of the following:** **7 x 3 = 21**
- Write Quick sort algorithm and sort the following sequence (12, 55, 44, 21, 87, 16) using quick sort.
 - Explain Insertion operation in Red Black tree with suitable example.
 - Define minimum spanning tree (MST). Write Prim's algorithm to generate a MST for any given weighted graph.
 - What is N queens problem? How N queens problem is solved by backtracking.
 - Explain and Write the Knuth-Morris-Pratt algorithm for pattern matching with suitable example.

SECTION C

- 3. Attempt any one part of the following:** **7 x 1 = 7**
- Illustrate the operation of counting sort on the following array: $A = \{6, 0, 2, 0, 1, 3, 4, 6, 1, 3, 2\}$
 - Solve the recurrence using recursion tree method
 $T(n) = 3T(n/4) + cn^2$
- 4. Attempt any one part of the following:** **7 x 1 = 7**
- What is skip list? Explain the Insertion operation in Skip list with suitable example.
 - Insert the following list of data items 20, 30, 35, 85, 10, 55, 60, 25, 5, 65, 70, 75, 15, 40, 50, 80, 45 in an empty B-tree. Using minimum degree 't' as 3.
- 5. Attempt any one part of the following:** **7 x 1 = 7**
- Write down the Dijkstra algorithm to solve the single source shortest path problem also write its time complexity.
 - What do you understand by convex hull? Discuss the algorithm to solve the convex hull problem.
- 6. Attempt any one part of the following:** **7 x 1 = 7**
- Explain the method of finding Hamiltonian cycles in a graph using backtracking method with suitable example.
 - Describe the Floyd Warshall algorithm for finding the all pair shortest path problem with suitable example
- 7. Attempt any one part of the following:** **7 x 1 = 7**
- Write and Explain Boyer-Moore Algorithm for string matching algorithm.
 - Prove that APPROX- VERTEX-COVER is a polynomial time 2-approximation algorithm