(Following Roll No. to be filled by candidate)

Roll No. 1 3 0 4 3 1 3 4 2 2

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B. TECH.

FIFTH SEMESTER EXAMINATION, 2015-16

ECS 502

DESIGN & ANALYSIS OF ALGORITHMS

Time:3 Hours **Max. Marks: 100**

Note:

- Attempt all questions.
- Marks and number of questions to be attempted from the section is mentioned before each section.

1. Attempt any *Two* parts of the following: [2×10]
   a. What are the different asymptotic notations used? Also solve the given recurrence relation:
   $T(n)=3(n/4)+n$
   b. Explain Heap sort algorithm with example.
   c. Describe the methods of analyzing an algorithm. What do you mean by best case, average case and worst case time complexity of an algorithm

2. Attempt any *Two* parts of the following: [2×10]
   a. Create a B-tree for the following list of elements:
   {86, 50, 40, 3, 94, 10, 70, 90, 110, 113, 116}
   with maximum degree = 5
   b. Explain the Red- black tree in detail with example showing insertion and deletion both.
   c. Differentiate between Binomial heaps and Fibonacci heaps.

3. Attempt any *Two* parts of the following: [2×10]
   a. Consider the knapsack instance $n = 3$, $(w_1, w_2, w_3) = (2,3,4)$ and $(P_1, P_2, P_3) = (1, 2, 5)$ and $m = 5$. Find the optimal solution.
   b. Find the shortest path from vertex 1 to vertex 3 in the following weighted graph (Figure -1) using Dijkstra's greedy algorithm

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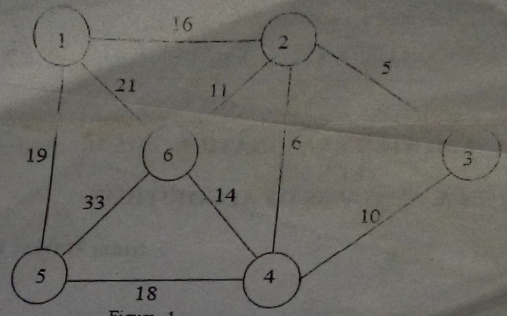

Figure -1

   c. Write down Prism's and Kruskal's algorithms for finding minimal spanning trees. Also solve a same problem using both algorithm

4. Attempt any *Two* parts of the following: [2×10]
   a. Write Floyd-Warshall algorithm to solve all pair shortest path problem. Also write its complexity.
   b. Explain n – queen and Graph coloring problem with examples.
   c. What is branch and bound technique? How travelling sales person problem can be solved using this technique.

5. Attempt any *Two* parts of the following: [2×10]
   a. Compare Approximation algorithms and Randomized algorithms
   b. Discuss the relationship between P, NP, NP complete and NP hard problems.
   c. Explain the Fast Fourier Transform with example. Give a recurrence for the running time of FFT, and solve the recurrence.