Code No: R32053 **R10** **Set No: 1**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Define the terms "Time complexity" and "Space complexity" of algorithms. Give a notation for expressing such a complexity and explain the features of such a notation.
   (b) Explain in detail about Recursive algorithms with neat examples. [8+7]

2. (a) Briefly explain about Binary search and it's applications [8+7]
   (b) Write a Pseudo code for the implementation of FIND instruction using linked list. Explain its implementation.

3. (a) Write and explain the control abstraction for Divide and Conquer [8+7]
   (b) Briefly explain Merge Sort Algorithm with suitable example and Derive its Time Complexity

4. (a) Explain the Knapsack problem. [5+10]
   (b) Find an optimal solution to the Knapsack instance n=7, m=15, $(p_1, p_2, p_3, \ldots p_7)=(10,5,15,7,6,18,3)$ and $(w_1, w_2, w_3, \ldots w_7)=(2, 3, 5, 7, 1, 4, 1)$ using greed approach.

5. (a) Write an algorithm of matrix chain multiplication. [8+7]
   (b) Solve the following 0/1 Knapsack problem using dynamic programming where array of profits is P= (11, 21, 31, 33) and array of weights is W=(2,11,22,15),Knapsack capacity is M=40 and number of items is n=4.

6. (a) Draw the state space tree for m coloring when n=3 and m=3. [8+7]
   (b) Describe the 4-queens problem using backtracking.

7. Explain the principles of:
   (a) Control Abstraction for LC-search.
   (b) Bounding.
   (c) FIFO Branch & Bound.
   (d) LIFO Branch & Bound. [15]

8. (a) How are P and NP problems are related? [8+7]
   (b) Explain the differences between decision and optimization problems.

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Code No: R32053 **R10** **Set No: 2**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Write an algorithm to find the sum of first n integers and Derive its time complexity.
   (b) Explain in detail about Amortized and Probabilistic analysis. [8+7]

2. (a) Explain in detail about Partition Exchange Sort algorithm.
   (b) Derive the average case Time Complexity of Quick Sort. [8+7]

3. (a) Explain Binary search algorithm and derive its time complexity. [8+7]
   (b) Compare and Contrast the performance analysis of Quick sort and Merge sort algorithm.

4. (a) Solve the following 0/1 knapsack problem using dynamic programming M=6,n=3,(w1,w2,w3)=(2,3,3), (p1,p2,p3)=(1,2,4)
   (b) Write an algorithm of all pairs shortest path problem [8+7]

5. (a) Define Spanning Tree. Explain Prim's algorithm with an example. [8+7]
   (b)Explain the terms feasible solution, optimal solution and objective function.

6. (a) Briefly explain 8-queen problem using Backtracking. Explain its applications.
   (b) Briefly explain Hamiltonian cycles using backtracking. [8+7]

7. (a) Explain the principles of Control Abstractions for LC-search.
   (b) Explain the principles of FIFO Branch & Bound. [8+7]

8. (a) Compare and contrasts between NP-HARD and NP-COMPLETE.
   (b) Briefly explain Cooks-theorem. [8+7]

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Code No: R32053 **R10** **Set No: 3**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Define Omega notation. Explain the terms involved in it. Give an Example.
   (b) Explain the usefulness of the following functional operations on sets.
   (i) MIN (ii) DELETE (iii) FIND (iv) UNION (v) INSERT [8+7]

2. Explain the Strassen's matrix multiplication concept with an example. Derive it's time complexity. [15]

3. (a) Write Greedy algorithm for sequencing unit time jobs with deadlines and profits.
   (b) What is the solution generated by the function JS when n=7, (p1, p2, …., p7) = (3, 5, 20, 18, 1, 6, 30), and (d1, d2, …., d7)=(1, 3, 4, 3, 2, 1, 2)? [8+7]

4. (a) Define Optimal Binary Search Tree. Briefly explain the functions of OBST.
   (b) Use function OBST to compute w(i,j),r(i,j) and c(i,j), 0<=I<j<=4, for the identifier set (a1, a2, a3, a4)=(count, float, if, while) with p(1)=1/20, p(2)=1/5 p(3)=1/10, p(4)=1/20, q(0)=1/5, q(1)=1/10, q(2)=1/5, q(3)=1/20, and q(4)=1/20. Using the r(i,j)'s, construct the Optimal Binary Search Tree. [15]

5. (a) Explain how Quick sort algorithm performs in worst case with an example.
   (b) What is an importance of Pivot selection in Quick sort algorithm. [8+7]

6. (a) Explain in detail about sum of subsets problem.
   (b) Briefly explain graph coloring using backtracking. [8+7]

7. (a) Explain the method of reduction to solve TSP problem using Branch and Bound.
   (b) Explain the principles of FIFO Branch and Bound. [8+7]

8. (a) Explain the classes of NP-hard and NP-complete
   (b) Describe clique decision problem and write algorithm for the same [8+7]

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Code No: R32053 **R10** **Set No: 4**

III B.Tech. II Semester Supplementary Examinations, January -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Common to Computer Science and Engineering and Information Technology)

Time: 3 Hours **Max Marks: 75**

Answer any FIVE Questions

All Questions carry equal marks

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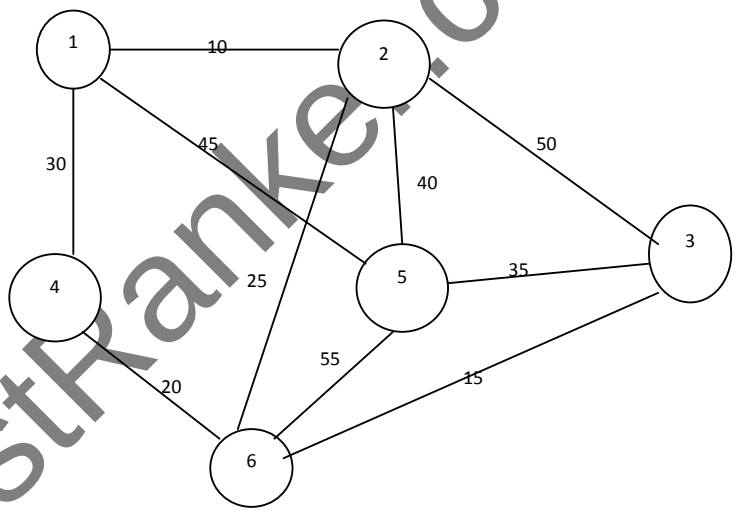
1. (a) Define Recursive algorithm. Explain in detail about Towers of Hanoi Algorithm with example.
   (b) Show that $9n^3 + 12n^4 + 100n^2 2^n = O(100n^2 2^n)$ [8+7]

2. (a) Explain in detail about Disjoint Sets and Disjoint set operations. [8+7]
   (b) Explain in detail about connected components and biconnected components.

3. (a) Compare Merge sort and Quick sort for the following data set.
   10, 30, 15, 45, 25, 30, 35, 20, 30, 40, 50
   (b) Explain Binary Search algorithm with an example. Derive it's Time Complexity. [8+7]

4. Write and explain the Prim's algorithm, applying the algorithm construct a minimal spanning tree for graph given bellow. [15]



5. (a) Explain in detail about Reliability Design with an example. [8+7]
   (b) Construct an optimal binary search tree for the following data: n=4, (a1,a2,a3,a4)=(do, if, int, while), p(1:4)= (3,3,1,1) and q(0:4)= (2,3,1,1,1).

6. Describe Backtracking technique to m-coloring graph. Explain with example. [15]

7. Explain traveling sales person problem using Branch and Bound technique. [15]

8. (a) Explain about cook's theorem
   (b) Write a nondeterministic Knapsack algorithm. [8+7]

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