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

III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science & Engineering and Information Technology)

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

Answer any FIVE Questions

All Questions carry equal marks

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1. Explain in brief about Asymptotic Notations with examples

2. (a) What is an Articulation Point? Write the Algorithm to find Articulation points
   (b) The pre-order and post-order sequences of a binary tree do not uniquely define binary tree. Justify your answer.

3. If matrices A= $\begin{bmatrix} 5 & 3 & 0 & 2 \\ 4 & 3 & 2 & 6 \\ 7 & 8 & 1 & 4 \\ 9 & 4 & 6 & 7 \end{bmatrix}$ B= $\begin{bmatrix} 3 & 2 & 4 & 7 \\ 2 & 5 & 2 & 9 \\ 3 & 9 & 0 & 3 \\ 7 & 6 & 2 & 1 \end{bmatrix}$

   Implement Strassen's matrix multiplication on A and B

4. (a) Write an algorithm of prim's minimum spanning tree.
   (b) Find the optimal solution of the Knapsack instance n= 7, M=15, (p1,p2,….p7) = (10,5,15,7,6,18,3) and (w1,w2,…..w7)=(2,3,5,7,1,4,1)

5. (a) Define merging and purging rules in o/1 Knapsack problem.
   (b) Write an algorithm for all pairs shortest path. Explain with an example

6. What is Graph coloring? Write an algorithm for it and explain with an example.

7. What is bounding? Explain the following with an example.
   (a) Job Sequencing with Deadlines
   (b) FIFO Branch and Bound
   (c) LC Branch and Bound

8. (a) Prove that Chromatic Number decision problem is NP-Complete.
   (b) Write notes on NP-hard graph problems.

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

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DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science & 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) Explain about Amortized analysis
   (b) Prove $3n^3 + 2n^2 = O(n)^3$; 3^n !=$O(2^n)$

2. (a) Write a non-recursive algorithm of in-order traversal of a tree and also analyze its space and time complexity.
   (b) How data representation of sets is performed? Write about connected components.

3. Show how the Quick sorts the following sequences of keys in ascending order
   22, 55, 33, 11, 99, 77, 55, 66, 54, 21, 32

4. (a) Write a pseudo code of a simpler version of Dijkstra's algorithm that finds only the distances from a given vertex to all other vertices of a graph represented by its weight matrix.
   (b) Write the procedure for GREEDY KNAPSACK (P, W, M, X, N) where P and W contains profits and weights, M is Knapsack size and X is the solution vector.

5. Consider 4 elements $a_1 < a_2 < a_3 < a_4$ with $q_0=0.25$, $q_1=3/16$, $q_2=q_3=q_4=1/16$. $p_1=1/4$, $p_2=1/8$ $p_3=p_4=1/16$.
   (a) Construct the optimal binary search tree as a minimal cost tree.
   (b) Construct the table of values W_{ij}, C_{ij}, V_{ij} computed by the algorithm to compute the roots of optimal subtrees

6. (a) There are 5 distinct numbers {1, 2, 3, 4, 5}. Find the combinations of these numbers such that the sum is 9. Use the backtracking model to arrive at the solution.
   (b) Discuss about (i) State space tree (ii) Graph coloring

7. (a) Draw the portion of state space tree generated by LCKNAP for the Knapsack instances : n=5,
   $(P_1,P_2,\ldots..P_5) = (10, 15, 6, 8, 4)$, $(W_1,W_2,\ldots.W_5) = (4, 6, 3, 4, 2)$ and M = 12.
   (b) Write about Row Minimization in TSP

8. (a) Write the properties of NP-Complete and NP-Hard Problems
   (b) State Cook's theorem and explain its importance.

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

III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science & 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 time and space complexity. Describe different notations used to represent these complexities.
   (b) Describe about Order of Growth with time function.
2. Explain the set representing using tree and develop algorithms for UNION and FIND using weighing and collapsing rules.
3. (a) Solve the recurrence relation of formula $T(n) = \begin{cases} g(n) & n \text{ is small} \\ 2T(n/2) + F(n) & otherwise \end{cases}$

   When (i) g(n) = O(1) and f(n)= O(n)
   (ii) g(n)= O(n) and f(n)=O(1)

   (b) Write and explain Divide and conquer algorithm for computing the no of levels in a binary tree.

4. (a) What do you mean by minimum spanning tree? write and explain algorithm for minimal spanning tree with an example.
   (b) Differentiate between Divide and Conquer algorithm & greedy Algorithm

5. (a) Solve the all-pair shortest path problem for given adjacency matrix graph using Floyd's algorithm

$$\begin{bmatrix} 0 & 2 & \infty & 1 & 8 \\ 6 & 0 & 3 & 2 & \infty \\ \infty & \infty & 0 & 4 & \infty \\ \infty & \infty & 2 & 0 & 3 \\ 3 & \infty & \infty & \infty & \infty \end{bmatrix}$$

   (b) Distinguish the following: (i) Dynamic Programming vs. Divide and Conquer
   (ii) Dynamic Programming vs. Greedy method

6. Write an algorithm for how Eight Queen's problem can be solved using back tracking and explain with an example

7. (a) Write a Program schema for a LIFO branch and bound search for Least-cost answer node.
   (b) Write a short note on LC search

8. (a) How to deal with a NP-Complete problem? Discuss with example
   (b) Write the properties of NP-Complete and NP-Hard Problems.

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

III B.Tech. II Semester Regular/Supplementary Examinations, May/June -2014

DESIGN AND ANALYSIS OF ALGORITHMS

(Computer Science & 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) How the performance can be analyzed ? Explain with the example.
   (b) What is Randomizer? Give Cons and Pros

2. For the following sequence of instructions

   UNION (1, 2, 2)
   UNION (2, 3, 3)
   :
   :
   UNION (n-1, n, n)
   FIND (1)
   FIND (2)
   :
   FIND (n)

   (a) Write the tree after (n-1) UNION operations.
   (b) Compute the cost of n FIND instructions

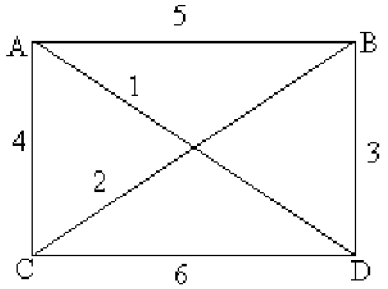
3. Apply quick sort to sort the list.

   E, X, A, M, P, L, E

   In alphabetical order . Draw the tree of recursive calls made.

4. (a) If objects are selected in order of increasing vi/wi then prove that the algorithm knapsack finds an optimal solution.
   (b) Write an algorithm for Single source shortest path. Explain with an example

5. (a) Find the shortest tour of TSP for the following graph using dynamic programming



   (b) What is the best method between greedy method and dynamic programming to solve single source shortest path problem? Justify your answer with example.

6. (a) Consider a set S= {5, 10, 12, 13, 15, 18} and d= 30. Solve it for obtaining sum of subset
   (b) What is Hamiltonian Cycle? Describe with an example

7. (a) Describe Travelling Salesperson Problem(TSP) with an example.
   (b) Explain the following with an example (i) Full Reduction (ii) Dynamic Reduction

8. (a) State and prove Cook's Theorem
   (b) Discuss about the complexity of NP-Hard problems.

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