Code No: R05220502 **Set No. 1**

II B.Tech II Semester Regular Examinations, Apr/May 2008
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Describe the performance analysis in detail.
   (b) Show that $f_1(n)+f_2(n) = 0(max(g_1(n), g_2(n))$ *where* $f_1(n) = 0(g_1(n))$ *and* $f_2(n) = 0(g_2(n))$. [8+8]
2. (a) Explain the strassen's matrix multiplication.
   (b) Write deletion algorithm, of Binary search tree. [8+8]
3. (a) Write Greedy algorithm to generate shortest path.
   (b) If $p_1/w_1 \geq p_2/w_2 ..... \geq p_n/w_n$ prove that knapsack generates an optimal solution to the given instance of the knapsack problem. [8+8]
4. (a) Explain matrix chain multiplication with an example.
   (b) Solve the following 0/1 Knapsack problem using dynamic programming P=(11,21,31,33), W=(2,11,22,15), C=40, n=4. [8+8]
5. (a) Explain the properties of strongly connected components.
   (b) Write a non-recursive algorithm of In-order traversal of a tree and also analyze its time complexity. [6+10]
6. (a) Write an algorithm of m-coloring problem.
   (b) Solve the 4-queens problem using backtracking. [8+8]
7. (a) Describe problem state, solution state and answer state with an example.
   (b) Explain the general method of Branch and Bound. [8+8]
8. (a) Explain the classes of P and NP.
   (b) Write a nondeterministic Knapsack algorithm. [8+8]

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Code No: R05220502 **Set No. 2**

II B.Tech II Semester Regular Examinations, Apr/May 2008
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define time complexity. Describe different notations used to represent there complexities.
   (b) Derive the function f(n)= $12n^2$+6n is $0(n^3)$ and w(n). [10+6]
2. (a) Suppose a binary tree has leaves $\ell_1\ell_2$.....l_m at depths $d_1, d_2....d_m$ respectively prove that $\sum_{i=1}^{m} 2^{-di} \leq 1$ and determine when the equality is true.
   (b) Write and explain the control abstraction algorithm of divide and conquer. [8+8]
3. (a) Write a greedy algorithm to the Job sequencing with deadlines.
   (b) Prove that the edge with the smallest weight will be part of every minimum spanning tree. [8+8]
4. (a) Explain matrix chain multiplication with an example.
   (b) Solve the following 0/1 Knapsack problem using dynamic programming P=(11,21,31,33), W=(2,11,22,15), C=40, n=4. [8+8]
5. (a) Explain the BFS algorithm with an example.
   (b) The Preorder and Postorder sequences of a binary tree do not uniquely define the binary tree. Justify the answer. [8+8]
6. (a) Describe graph coloring problem and its time complexity.
   (b) Write an algorithm of 8-queens problem using backtracking. [8+8]
7. (a) Write an algorithm to solve the Knapsack problem with the Branch and Bound
   (b) Differentiate between Dynamic Knapsack and Branch and Bound Knapsack problem. [10+6]
8. (a) Explain the classes of P and NP.
   (b) Write a nondeterministic Knapsack algorithm. [8+8]

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Code No: R05220502 **Set No. 3**

II B.Tech II Semester Regular Examinations, Apr/May 2008
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Consider a polynomial in n of the form
$f(n) = \sum_{i=0}^{m} a_i n^i. = a_m n^m + a_{m-1} n^{m-1} + ... + a_2 n^2 + a_1 n + a_0$ where $a_m > 0$ then $f(n) = \Omega(n^m)$
   (b) Differentiate between profilling and debugging. [10+6]

2. (a) Write and explain the control abstraction for Divide and conquer.
   (b) Suggest refinements to mergesort to make it in-place. [8+8]

3. State whether the following statements are true or false. Justify the answer.
   (a) If e is a minimum weight edge in a connected weighted graph, it must be among edges of at least one minimum spanning tree of the graph.
   (b) If e is a minimum weight edge in a connected weighted graph, it must be among edges of each minimum spanning tree of the graph.
   (c) If edge weights of a connected weighted graph are all distinct, the graph must have exactly are minimum spanning tree.
   (d) If edge weights of a connected weighted graph are not all distinct, the graph must have more than one minimum spanning tree. [16]

4. (a) In how many ways, the following chain of matrices may be multiplied?
   A X B X C X D
   [2X5] [5X3] [3X6] [6X4]
   Find the no. of multiplications required in each case.
   (b) Differentiate between Greedy method and Dynamic programming
   (c) Define merging and purging rules of O/1 Knapsack problem. [6+5+5]

5. (a) Explain game tree with an example.
   (b) Prove or disprove an undirected graph G=(V,E) is biconnected if and only if for each pair of distinct vertices u and v there are two distinct paths from u to v that have no vertex in common except u and v. [8+8]

6. (a) Draw the state space tree for m coloring when n=3 and m=3
   (b) Write a recursive backtracking algorithm. [8+8]

7. (a) Explain the general method of Branch and Bound.

(b) Explain the principles of LIFO Branch and Bound. [8+8]

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

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Code No: R05220502 **Set No. 4**

II B.Tech II Semester Regular Examinations, Apr/May 2008
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science & Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Develop a probabilistic algorithm to find the value of the integral $\int_0^2 \sqrt{4-x^2}\,dx$
   (b) Differentiate between priori analysis and posteriori analysis. [10+6]
2. (a) Write and explain the control abstraction for Divide and conquer.
   (b) Suggest refinements to mergesort to make it in-place. [8+8]
3. (a) What is spanning tree? Explain the prim's algorithm with an example.
   (b) Explain the terms Feasible solution, optimal solution and objective function. [10+6]
4. (a) Write a pseudocode for a linear time algorithm that generates the optimal Binary search tree from the root table.
   (b) Find the minimum no of operations required for the following chain matrix multiplication using dynamic programming.
   A(30,40) * B(40,5) * C(5,15) * D(15,6). [8+8]
5. Write an algorithm of Biconnected components and also analyze its time complexity. [16]
6. (a) Draw the state space tree for m coloring when n=3 and m=3
   (b) Write a recursive backtracking algorithm. [8+8]
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+8]
8. (a) What is meant by Halting problem explain with an example.
   (b) Explain the classes of P and NP. [8+8]

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