Code No: V3123 **R07** **Set No: 1**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

DESING AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Explain the asymptotic notations used in algorithm analysis.
   (b) What is probabilistic analysis? Explain with an example.

2. (a) Explain the UNION algorithm with weighting rule.
   (b) What is spanning tree? Explain the Prim's algorithm with an example.

3. (a) Sort the following values in the ascending order using quick sort algorithm.
   20, 30, 80, 50, 40, 70, 60, 90, 10
   (b) Explain Strassen's matrix multiplication.

4. (a) Can we solve 0/1 knapsack problem with greedy method? Describe it with an example.
   (b) What is job sequencing with deadlines problem? Let n=5, $(p_1, p_2, \ldots, p_5) = (10,3, 33, 11, 40)$ and $(d_1, d_2, \ldots, d_5) = (3, 1, 1, 2, 2)$. Find the optimal solution using greedy algorithm.

5. (a) What is reliability design problem? Give its recurrence relation.
   (b) What do you mean by forward and backward approach of problem solving in dynamic Programming?

6. (a) Write an algorithm of m-coloring problem.
   (b) Describe the 4-queens problem using backtracking.

7. (a) Explain the principles of the following:
   i) FIFO branch and Bound ii) LC Branch and Bound
   (b)Draw the portion of the state space tree generated by LCBB for the knapsack instances: n=5, (P1, P2,… , P5) = (12,10,5,9,3), (w1, w2, ...,w5)=(3, 5, 2, 5, 3) and M =12.

8. (a) Explain the satisfiability problem and write the algorithm for the same.
   (b) Explain the classes of NP-Hard and NP-Complete.

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Code No: V3123 **R07** **Set No: 2**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

DESING AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What is meant by time complexity? What is its need? Explain different time complexity notations. Give examples one for each.

2. (a) Explain the FIND algorithm with collapsing rule.

   (b) What is spanning tree? Explain the Kruskal's algorithm with an example.

3. (a) What is binary search? How it can be implemented by divide and conquer strategy? Explain with example.
   (b) What is the divide and conquer strategy? Give its recurrence relation.

4. (a) Write and explain the control abstraction for divide and conquer.
   (b) Draw a simple, connected, weighted graph with 8 vertices and 16 edges, each with unique edge weight. Apply Prim's algorithm to get minimum-cost spanning tree. Show all the stages.

5. (a) Find the minimum number of operations required for the following chain matrix multiplication using dynamic programming.
   A(20,30) * B(30,10) * C(10,5) * D(5,15).
   (b) Solve the following 0/1 Knapsack problem using dynamic programming
   m=8, n=3, $(w_1, w_2, w_3) = (3, 6, 6)$, $(p_1, p_2, p_3) = (2, 3, 4)$

6. (a) Draw and explain the portion of the tree for 4-queens problem that is generated during backtracking.
   (b) Write a recursive backtracking algorithm for sum of subsets problem.

7. (a) Explain the principles of LIFO Branch and Bound.
   (b) What do you mean by bounding? Explain how these bounds are useful in branch and bound methods.

8. (a) Describe the cook's theorem.
   (b) Explain the strategy to prove that a problem is NP hard.

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Code No: V3123 **R07** **Set No: 3**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

DESING AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) What is amortized analysis? Explain with example.
   (b) What is big "oh" notation? Show that if $f(n) = a_m n^m + \ldots.. + a_1 n + a_0$ then $f(n) = O(n^m)$.

2. (a) What is weighting rule for Union(i,j)? How it improves the performance of union operation? Explain with example.
   (b) What is biconnected graph? How to determine biconnected components of graph?

3. (a) Explain the way divide and conquer works for quick sort with example.
   (b) Apply merge sort and show the file after each splitting and then merging for the following input:
   50, 10, 25, 30, 15, 70, 35, 55

4. (a) What is a knapsack problem? Find an optimal solution to the knapsack instance n=7, m=18, $(p_1, p_2, \ldots, p_7) = (15, 5, 6, 7, 16, 10, 1)$, and $(w_1, w_2, \ldots, w_7) = (7, 4, 8, 2, 1, 4, 1)$.
   (b) Describe the general method for greedy strategy.

5. (a) What is traveling sales person problem? How can it be solved using dynamic programming approach?
   (b) Describe the all pairs shortest path problem with suitable example.

6. (a) Write the control abstraction of backtracking.
   (b) What is Hamiltonian cycle? Describe a backtracking algorithm that finds all the Hamiltonian cycles in a graph.

7. (a) Explain the following
   (i) Control abstractions for LC – search (ii) Bounding
   (b) Illustrate LCBB solution to solve the knapsack problem.

8. (a)What are deterministic and non-deterministic algorithms? Distinguish between them.
   (b) Differentiate between NP-complete and NP-Hard.

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Code No: V3123 **R07** **Set No: 4**

III B.Tech. I Semester Supplementary Examinations, November/December - 2012

DESING AND ANALYSIS OF ALGORITHMS

(Computer Science and Engineering)

Time: 3 Hours **Max Marks: 80**

Answer any FIVE Questions

All Questions carry equal marks

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1. (a) Define Theta notation. Explain the terms involved in it. Give an example.
   (b) What is meant by asymptotic notation? Why it is used? Explain.

2. (a) Take a simple graph with 8 nodes and 16 edges. Apply Prim's algorithm to find spanning tree for the graph.
   (b) Explain the representations of disjoint set union with example.

3. (a) Apply divide and conquer strategy to the following input values for searching 112 and -14 by showing the values of low, mid, high for each search.
   -15, -6, 0, 7, 9, 23, 54, 82, 101, 112, 125, 131, 142, 151
   (b) Describe the way to compute the product of two n x n matrices ($n = 2^k$) using divide and conquer strategy.

4. (a) What is minimum-cost spanning tree problem? How can it be solved by greedy method?
   (b) Describe the job sequencing with deadlines problem with example.

5. (a) What is 0/1 Knapsack problem? Define merging and purging rules of 0/1 Knapsack problem.
   (b) State the principle of optimality and describe how it can be used in dynamic programming to get optimal solution.

6. (a) Describe the 8-queens problem.
   (b) Explain the general backtracking process using recursion.

7. (a) Differentiate between Dynamic Knapsack and Branch and Bound Knapsack problem.
   (b) Draw the portion of the state space tree generated by FIFOBB for the knapsack instances: n=5, (P1, P2,… , P5) = (12,10,5,9,3), (w1, w2, ...,w5)=(3, 5, 2, 5, 3) and M =12.

8. (a) Explain the classes of P and NP.
   (b) Distinguish between deterministic and non-deterministic algorithms.

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