Code No: R32053

R10

Set No: 1

III B.Tech. II Semester Regular Examinations, April/May -2013
DESIGN AND ANALYSIS OF ALGORITHMS
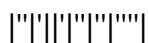(Common to Computer Science and Engineering & Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Define an algorithm. What are the different criteria that satisfy the algorithm?
   (b) Explain how algorithms performance is analysed? Describe Asymptotic notation?

2. (a) Explain the set representation using trees.
   (b) Develop the algorithms for the following
       i). UNION
       ii) FIND
       iii) WEIGHTED UNION.

3. (a) Draw the binary decision tree for the following set
       (3, 6, 9, 12, 15, 18, 21, 24, 27, 30, 33, 36, 39, 42, 45, 47)
   (b) Derive the time complexity for Quick Sort.

4. (a) Present a Greedy Algorithm for Sequencing Unit Time Jobs with deadlines and
       profits.
   (b) What is greedy method? Explain with example.

5. (a) Find the solution for the knapsack problem. When n=3,
       (W_1, W_2, W_3)=(18, 15, 10,) . (P1, P2, P3)= (25, 24, 15) and m=20.
   (b) Explain the general concept of Dynamic programming.

6. (a) Explain, how the Hamiltonian circuit problem is solved by using the
       backtracking concept.
   (b) Device a backtracking algorithm for m-coloring graph problem

7. (a) Write FIFOBB algorithm for the 0/1 knapsack problem.
   (b) Explain the general method of Branch and Bound.

8. (a)Write short notes on
       i) Classes of NP-hard
       ii) Classes of NP-complete
   (b) Prove that if $NP \neq CO-NP, then\ P \neq NP$.

*****

|"|'|||'|"|'|""|

Code No: R32053

R10

Set No: 2

III B.Tech. II Semester Regular Examinations, April/May -2013
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to Computer Science and Engineering & Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) What are the different techniques to represent an algorithm. Explain.
   (b) Give an algorithm to solve the towers of Hanoi problem.

2. (a) Give the trees for the set { 1, 2, 3, 4, 5, … n} by using weighting rule.
   (b) Give an algorithm for implementation of union instruction using linked list
   and explain its implementation.

3. (a) Draw the tree of calls of merge sort for the following set.
   (35, 25,15,10,45, 75, 85, 65, 55, 5, 20, 18)
   (b) Compare Quick sort algorithm performance from insertion sort algorithm.

4. (a) Give the control abstraction for greedy method.
   (b) Present an optimal Randomized algorithm for minimum cost spanning trees.

5.   (a) Find the shortest paths between all pairs of nodes in the following graph
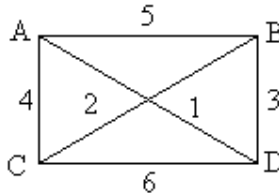
   (b) What are the advantages of finding shortest paths and also explain the application areas.

6. (a) Compare and contrast between Brute force approach Vs Back tracking.
   (b) Suggest a solution for 8 queen's problem.

7. Apply the Branch and Bound algorithm to solve the TSP, for the following cost matrix.

$$\begin{bmatrix} \infty & 11 & 10 & 9 & 6 \\ 8 & \infty & 7 & 3 & 4 \\ 8 & 4 & \infty & 4 & 8 \\ 11 & 10 & 5 & \infty & 5 \\ 6 & 9 & 5 & 5 & \infty \end{bmatrix}$$

8. Consider the problem DNF-DISSAT which takes a Boolean formula S in
   (a) disjunctive normal form (DNF) as input and asks if S is dissatisfiable that is variable
   of S so that if evaluates to 0. Show that DNF – DISSAT is NP- complete.
   *****

|"|'|||'|'|'|""|

Code No: R32053

R10

Set No: 3

III B.Tech. II Semester Regular Examinations, April/May -2013
**DESIGN AND ANALYSIS OF ALGORITHMS**
(Common to Computer Science and Engineering & Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) Write an algorithm to find the sum of individual digits of a given number.
   (b) Explain the different looping statements used in pseudo code conventions.

2. (a) Write a short note on spanning trees.
   (b) What are connected and bi – connected components. Explain with suitable example.

3. (a) Discuss briefly about the randomized quick sort.
   (b) Draw the tree of calls of merge for the following set of elements
   (20, 30, 10, 40, 5, 60, 90, 45, 35, 25, 15, 55)

4. (a) What are the observation that should made for finding the shortest paths by
   using Greedy.
   (b) Explain, how to find the minimum cost spanning tree by using Prim's
   Algorithm.

5. Find the shortest path b/w all pairs of nodes in the following graph and explain with the
   suitable algorithm

6. (a) Explain about graph coloring and chromatic number.
   (b) For the graph given below, draw the portion of the state space tree generated by
   procedure MCOLORING.

7. (a) Explain how the traveling salesperson problem is solved by using LC Branch and
   Bound.
   (b) Write the general algorithm for Branch and Bound.

8. (a) Show that any language in NP can be decided by an algorithm running in time $2^{o(n^k)}$
   for some constant k.
   (b) How are P and NP problems related?

*****

|"|'|||'|''|'|''"|

R10

Set No: 4

Code No: R32053

III B.Tech. II Semester Regular Examinations, April/May -2013
DESIGN AND ANALYSIS OF ALGORITHMS
(Common to Computer Science and Engineering & Information Technology)

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

Answer any FIVE Questions
All Questions carry equal marks
*****

1. (a) What is meant by recursion. Explain with example, the direct and indirect recursive algorithms.
   (b) List the advantages of pseudo code convention over flow charts.

2. (a) Write a pseudo code for the implementation of UNION instruction using linked list. Explain the working of the implementation.
   (b) Explain the usefulness of the following fundamental operations in sets.
   i). MIN   ii) DELETE   iii) FIND   iv) INSERT

3. (a) Write an algorithm for quick sort by using recursive method.
   (b) Explain Strassen is matrix multiplication algorithm with an example.

4. (a) Define minimum cost spanning trees. Explain them with suitable example.
   (b) What is the solution generated by the function JS when n = 7, P [1 : 7] = (3,5,20,18,1,6,30) and W [1:7] = (1,3,4,3,2,1,2)

5. (a) Discuss the dynamic programming solution for the problems of reliability design.
   (b) Define merging and purging rules in O/1 knapsack problem.

6. (a) Compare and contrast between Brute force approach and Backtracking.
   (b) Find the Hamiltonian circuit in the following graph by using backtracking.

7. What is traveling sales person problem? Solve the following sales person problem instance using branch and bound.

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

8. Given an integer m x n matrix A and an integer m-vector b, the 0-1 integer programming problem asks whether there is an integer n-vector x with elements in the set {0,1} such that Ax ≤ b. Prove that 0-1 integer programming is Np-complete.

*****

|''|'||'|''|''|''||''|''|