Code No: 07A60512 **R07** **Set No. 2**

III B.Tech II Semester Examinations,APRIL 2011
DESIGN AND ANALYSIS OF ALGORITHMS
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. Explain the principles of
   (a) Control Abstraction for LC-search.
   (b) Bounding.
   (c) FIFO branch and bound.
   (d) LIFO branch and bound. [16]

2. (a) Compare and contrast between the greedy algorithm and dynamic programming method.
   (b) What is the principal of optimality? Explain with some suitable example. [8+8]

3. (a) Explain when the quick sort is preferred to mergesort and vice-versa.
   (b) What is the principle of partitioning in quick sort? Give an example. [8+8]

4. (a) Let w= (5, 10, 10, 25) and m=25. Find all possible subsets of W that sum to M using fixed tuple length and variable tuple length formulation.
   (b) Draw the state space tree for m-coloring graph. [8+8]

5. (a) Explain strossen's matrix multiplice in detail.
   (b) Write an algorithm for Fibonacci of n given numbers and also find time and space complexities. [8+8]

6. Show that the knapsack problems is solvable in polynomial time if the input is given in a unary encoding. That is, show that knapsack is not strongly Np-hard. What is the running time of your algorithm. [16]

7. Write an algorithm for breadth first traversal so that all connected components of an undirected graph G are printed out. Assume that G is the input in adjacency list with HEAD as the head node for the adjacency list. [16]

8. Consider the adjacency list (with edge weights in parentheses) for a digraph.
   A: B(4. O), F(2.0)
   B: A(1.0), C(3.0), D(4. 0)
   C: A(6.0), B(3.0), D(7.0)
   D: A(6.0), E(2.0)
   E: D(5.0)
   F:D(2.0), E(3.0)

(a) The digraph has 3 shortest path from C to E (i.e, all with the same total weight). Find them. (list the sequency of vertices in each path).

(b) Which of these paths is the one that would be found by Dijkstra's shortest path algorithm with s = C? [8+8]

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Code No: 07A60512 **R07** **Set No. 4**

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Electronics And Computer Engineering

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

Answer any FIVE Questions
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1. (a) Write an algorithm to solve the knapsack problem with branch and bound algorithm.
   (b) Explain the solution to the 0/1 knapsack problem by using FIFOBB. [8+8]

2. (a) Find the solution for the knapsack problem. When n = 3, (w_1, w_2, w_3) = (18,15,20), (p_1, p_2, p_3) = (25, 24, 15) and m = 20, using dynamic programming.
   (b) What is the principle of optimality? Explain its significance. [8+8]

3. (a) Describe in detail about the time and space complexity of an algorithm.
   (b) Write an algorithm for multiplication of two matrices and analyse your algorithm. [10+6]

4. (a) Explain the 8-queen problem.
   (b) Generate all permutations of $\{a, b, c, d\}$ using backtracking. [8+8]

5. Explain how DFS can be used to identify the connected components in a graph with an example. [16]

6. (a) Write prim's algorithm under the assumption that the graphs are represented by adjacency lists.
   (b) Show that greedy strategy does not necesserily yield optimal solution for 0/1 knapsack problem. [10+6]

7. (a) What happens to the efficiency of divide and conquer algorithms if instead of using a threshold to decide when to revert to the basic sub algorithm, we recur at most r times, for some constant r, and use the basic algorithm?
   (b) What is the time complexity of binary search tree for an unsuccessful search. [10+6]

8. Give a dynamic programming solution for the subset sum problem. Analyze the asymptotic order of your solution. Explain why this solution does not put the subset sum problem in NP-hard. [16]

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Code No: 07A60512 **R07** **Set No. 1**

III B.Tech II Semester Examinations,APRIL 2011
DESIGN AND ANALYSIS OF ALGORITHMS
Electronics And Computer Engineering

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

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the non-deterministic search and sort algorithms.
   (b) Explain the cook's theorem. [8+8]

2. Compute a minimum cost spanning tree for the graph using as shown in figure 1
   (a) prims algorithm
   (b) kruskals algorithm. [8+8]

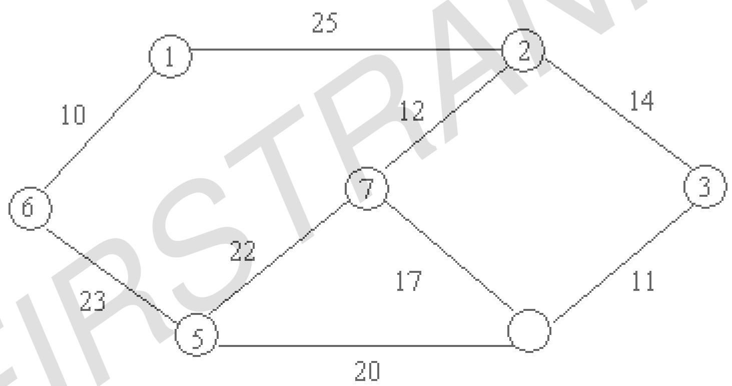

Figure 1:

3. (a) Solve the following recurrence relation: $T(n) = 4T(n/2) + n^2)$, where $n > 1$ and is a power of 2.
   (b) What do you mean by the input size of a problem? Explain its significance. [10+6]

4. (a) Explain quick sort method with an example?
   (b) Solve the recurrence relation for the merge-sort time complexity. [8+8]

5. (a) Define a spanning tree with an example and discuss its applications.
   (b) Explain the strongly connected and weakly connected graphs with an example. Compute the indegree, outdegree and degree of each node for that graph. [6+10]

6. (a) Write FIFOBB algorithm for the 0/1 knapsack problem.
   (b) Explain the general method of Branch and Bound. [8+8]

7. Design a three stage system with device types D1, D2, D3. The costs of all devices are Rs. 30, Rs.15 and Rs 20.respectivesly. The cost of the system is to be no more than Rs.105. The reliability of each device type is 0.9, 0.8 and 0.5 respectively. [16]

8. How many solutions are there to the eight queens problem? How many distinct solutions are there if we do not distinguish solutions that can be transformed into one another by rotations and reflections. [16]

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Code No: 07A60512 **R07** **Set No. 3**

III B.Tech II Semester Examinations,APRIL 2011
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Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain Row reduction and column reduction in traveling sales person problem.
   (b) Explain the solution of 4 queen's problem using FIFO branch and bound technique. [8+8]

2. (a) Define an algorithm. Describe the characteristics of an algorithm.
   (b) What do you mean by performance analysis of an algorithm? Explain. [8+8]

3. Write and explain the single source shortest path problem with an example. [16]

4. Write an algorithm to compute the roots of optimal sub tree by using the dynamic programming algorithm. Prove that algorithm for construction of an optimal binary search tree requires O(n^3)time. [16]

5. (a) On which input data does the algorithm quick sort exhibit worst case behavior?.
   (b) Write an algorithm for finding the kth smallest element. [8+8]

6. (a) Show that the job sequencing with dead lines problem is NP-hard.
   (b) Show that optimal code generation is NP-hard for leaf days on an infinite register machine.(Hint: Use FNS). [8+8]

7. Generalize Hamiltonian so that it processes a graph whose edge have costs associated with them and finds a Hamiltonian cycle with minimum cost. you can assume that all edge costs are positive. [16]

8. Find the Strongly connected components in the graph of figure 2.

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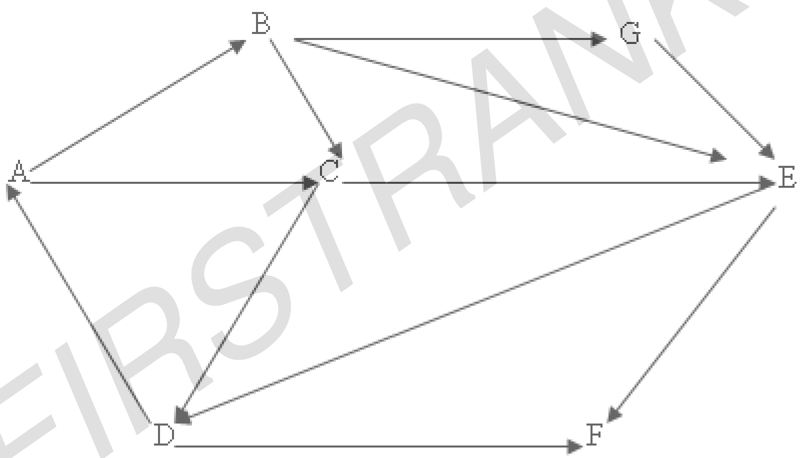

Figure 2: