Code No: 45015 **R07** **Set No - 3**

III B.Tech I Semester Regular Examinations,Nov/Dec 2009
DESIGN 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) Give the partition algorithm for Quick sort.
   (b) Modify the above algorithm to get the selection sort algorithm. Explain the transition. [8+8]

2. How many lines, as a function of n (in θ (.) form), does the following program print? Write a recurrence equation and solve it. Assume n is a power of 2.

   $Function\, f(n)$
   $\{$
   $if\ (n > 1)\ \{print\, f(\text{“}stil\lg oing''); \}$
   $f(n/2);$
   $f(n/2);$
   $\}$

   [16]

3. Write a Backtracking algorithm for the sum of subsets problem using the state space tree corresponding to the variable tuple size formulation. [16]

4. Write a branch- and - bound algorithm for the job sequencing with deadlines problem. [16]

5. For each of the following combination of properties either exhibit a connected graph on 10 vertices that exhibits these properties, or show that no such graph can exist
   (a) Eulerian but not Hamiltonian.
   (b) Hamiltonian but not Eulerian.
   (c) Hamiltonian and 2-colorable. [16]

6. (a) Find one problem for which the principle of optimality does not hold. Explain why the principle does not hold.
   (b) Define merging and purging rules of O/1 Knapsack problem. [8+8]

7. (a) Given a list of n positive integers (n is even), divide the list into two sublists such that the differences between the sums of the integers in the two sublists is minimized. Is this problem an NP complete problem. If yes, justify your answer.
   (b) List three problems that have polynomial time algorithms. Justify your answer.

   [8+8]

8. (a) Compute the time complexity of deriving minimum spanning tree from the weighted connected graph using Kruskal's algorithm

   (b) Prove that if $p_1/w_1 \geq p_2/w_2 \geq .... \geq p_n/w_n$,, then FractionalGreedyKnapsack algorithm generates an optimal solution to the given instance of the fractional Knapsack problem. [8+8]

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