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53 (CS 503) DAAL

2016

**DESIGN AND ANALYSIS
OF ALGORITHM**

Paper : CS 503

Full Marks : 100

Time : Three hours

***The figures in the margin indicate
full marks for the questions.***

Answer ***any five*** questions.

1. (a) Prove that quick sort suffers in worst case complexity when an array is sorted and the key element is the first or last element of the array.

(b) Compute the time complexity for the following recursive relation

$$T(n) = T(n/2) + c \qquad 15+5$$

Contd.

2. A number of processes want to execute by minimum number of processors. Design a greedy algorithm for this situation.

Apply your algorithm on the following processes. 20

	P_1	P_2	P_3	P_4	P_5	P_6	P_7	P_8	P_9	P_{10}
Arrival Time	1	2	3	5	5	4	6	8	9	11
Finish Time	3	4	6	7	9	8	9	10	11	13

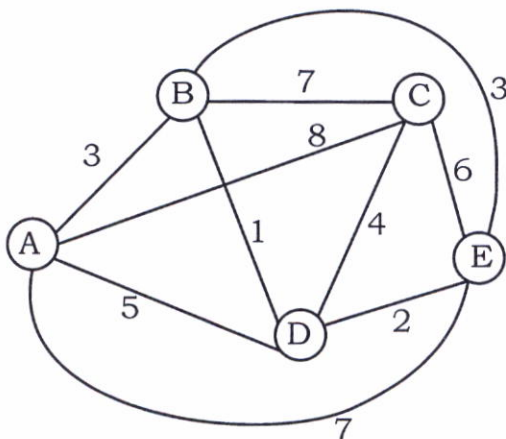
3. Write down the CUT_ROD problem. Consider the following example :

Size	1	2	3	4
Profit	5	8	9	6

Draw the recursive tree (sequence of calls should be mentioned clearly) for brute force approach and dynamic programming. Compute the complexity for both the cases.

20

4. Consider the following TSP problem. Use branch and bound to compute the optimized cost. 20



5. With an example prove that greedy algorithm cannot produce optimal solution (always) for 0/1 knapsack whereas for fractional knapsack it always produce optimal solution. 20
6. (a) Discuss about Cooks theorem.
- (b) If Hamiltonian cycle is NP complete then TSP problem is NP complete.
- (c) Prove that 2 SAT is not NP complete. 5+5+10
