Roll No. | | | | | | | | | | | | Total No. of Pages : 2

Total No. of Questions : 09

B.Tech. (CSE) (Sem.–5)

DESIGN AND ANALYSIS OF ALGORITHMS

Subject Code : CS-307

Paper ID : [A0467]

Time : 3 Hrs. Max. Marks : 60

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students has to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.**

SECTION-A

1. Write briefly :

   a. What is difference between an algorithm and a program?

   b. State principle of optimality.

   c. What do you mean by control abstraction?

   d. What are implicit and explicit constraints?

   e. How is randomized quicksort algorithm different from quicksort algorithm?

   f. What is the need of approximation algorithms?

   g. Prove that if $f_1(n)=O(g_1(n))$ and $f_2(n)=O(g_2(n))$,

   then $f_1(n) + f_2(n) = O(\max(g_1(n) + g_2(n))$.

   h. Define the following terms in context of backtracking: E-node, live node, and dead node.

   i. What do you mean by recurrence relations? How are they solved?

   j. What are hard problems?

SECTION-B

2. What are asymptotic notations? Describe with the help of examples various commonly used asymptotic notations.
3. Write breadth first search and depth first search algorithms.
4. Write and explain mergesort algorithm. What is the advantage and disadvantage of this algorithm?
5. Describe in brief various string algorithms.
6. Explain the general method of Branch and Bound.

SECTION-C

7. What is 0/1 Knapsack problem? How it is different from fractional knapsack problem? Describe by giving an algorithm, how 0/1 knapsack problem can be solved using dynamic programming approach of algorithm design.
8. Write recursive binary search algorithm. Using binary search algorithm, find the number of comparisons required to find key value 9 in the given list: -15, -6, 0,7,9,23,54,82,101,112,125,131,142,151
9. Write short notes on:
   a. Approximate algorithms for NP-complete problems
   b. Problem classes P, NP, NP-hard and NP-complete