Reg. No. : | | | | | | | | | | |

Question Paper Code: 55084

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2017

Fifth Semseter

Information Technology

15UIT504 - ANALYSIS AND DESIGN OF ALGORITHMS

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. In order to move a tower of 6 rings from one peg to another, how many moves are required?

   (a) 15 (b) 7 (c) 63 (d) 32

2. Scatter plots of functions in $\Theta(n \lg n)$ and $\Theta(n^2)$ will have _____ shape.

   (a) concave (b) linear (c) convex (d) incomparable

3. The relationship between number of back edges and number of cycles in DFS is

   (a) Both are equal
   (b) Back edges are half of cycles
   (c) Back edges are one quarter of cycles
   (d) There is no relationship between no. of edges and cycles

4. If a problem is NP-complete, it must also be in NP.

   (a) True (b) False (c) Unknown (d) None of these

5. A variation of an optimal solution belonging to a different branch other than the best bound branch of the state space tree is termed as

   (a) Best branch bound (b) Best first branch and bound
   (c) Worst branch ad bound (d) Best-Worst branch and bound

PART - B (5 x 3 = 15 Marks)

6. Name the criteria used to identify the best algorithm.

7. Compare the order of growth of two functions: ½ n(n -1) and n^2.

8. Write brute force algorithm for counting the number of vowels in a given text.
E,X,A,M,P,L,E.

9. Given an example of text of length 'n' and a pattern of length 'm' that constitutes a worst case input for the brute force string matching algorithm. Exactly how many character comparisons will be made for such input.

10. Write an algorithm to find the smallest element in an array of n elements using presorting based approach and give its efficiency.

PART - C (5 x 16 = 80 Marks)

11. (a) Locker door puzzle: There are n lockers in a hallway, numbers sequentially from 1 to n. Initially all the locker doors are closed. You make n passes by the lockers, each time starting with locker #1. On the i^{th} pass, i=1,2,…,n, you toggle the door of every i^{th} locker: if the door is closed , you open it; if it is open, you close it. For example, after the first pass every door is open; on the second pass you only toggle the even-numbered lockers (#2, #4…) so that after the second pass the even doors are closed and the odd ones are open, and so on. After the last pass, which locker doors are open and which are closed (When n=10)? Write an algorithm for the above puzzle and analyze its efficiency. (16)

Or

(b) Design an algorithm for computing gcd(m, n) using Euclid's algorithm. (16)

12. (a) Rahul is a cricket team coacher. He wants to find the minimum and maximum scorer of his team members. The player's average score of the last few matches are as follows 37, 40, 87, 25, 78, 33, 89, 11, 21, 30 and 17. Write a suitable algorithm to find the solution using divide and conquer method and also find the algorithms time efficiency. (16)

Or

(b) Design a recursive and non recursive algorithm for finding the Fibonacci series and Compare both recursive and non recursive procedures and find out which is efficient. (16)

13. (a) Apply merge sort algorithm to sort the following array {90, 45, 88, 68, 29, 17, 34, and 98}. (16)

Or

(b) Write the pseudo code for the bubble sort and analyze its time efficiency along with the number of swapping involved in it. Also explain the logic of pseudo code with an example. (16)

14. (a) Given a set of 6 elements, S = {1, 2, 5, 6, 8}. Generate all the possible combinations of the subsets whose sum is equal to the value, M = 9. Construct the state space tree for the above problem. (16)

Or

(b) Anand is planning for a holy tour to visit all the temples in the southern part of India. Help him with a suitable algorithm using backtracking technique to visit the temples and return back to home. What is your algorithms time complexity? (16)

15. (a) Discuss about the clique vertex cover parallel algorithms. (16)

Or

(b) Explain the classes P, NP, NP complete, and NP hard with examples. How do we show that a problem is in NP complete? (16)

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