53 (CS 503) DAAL

2017

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)* With an example clearly discuss about the merge sort algorithm.

   (b) Find the recursive relation and compute time complexity. 10+10

2. Consider the following functions and compute the bounds in terms of big O and big theta notation : 10+10

   (a) $f(n) = 3n^4 + n - 7$

   (b) $g(n) = 10n^3 \log_2 n + n^2 + 10n + 20$

   Compute the relation among $f(n)$ and $g(n)$ in terms of big O and big theta. 20

3. *(a)* Design a greedy algorithm for finding the maximum number of the process can be executed by a single processor.

(b) Apply your algorithm on the following data.

Process	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
Arrival time	1	1	3	2	4	5	6	9	12	14
Finish time	2	3	4	5	6	11	8	13	16	17

10+10

4. With suitable example discuss that greedy algorithm always provide optimal result for fractional knapsack, however it is not true for 0/1 knapsack. 20

5. *(a)* Consider the length and profit of a cut-rod problem.

Length	1	2	3	4
Profit	5	9	12	16

Compute the optimal profit using dynamic programming.

(b) With example discuss about BFS and DFS. 10+10

6. *(a)* Define the terms —

(i) NP

(ii) NP hard

(iii) NP complete

(b) Prove that 2SAT is not NP complete. 10+10