R13

Code No: 114CS

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B.Tech II Year II Semester Examinations, November/December - 2015
DESIGN AND ANALYSIS OF ALGORITHMS
(Computer Science and Engineering)

Time: 3 Hours   Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit.
Each question carries 10 marks and may have a, b, c as sub questions.

PART- A (25 Marks)

1.a) Arrange the following functions in increasing order
$n, \log n, n^2, n^3, n\log n, 2^n$ [2]

b) Find the worst-case, best-case and average –case time complexity of the binary search. [3]

c) Write an algorithm for set Union operation. [2]

d) Explain the tree traversal techniques with an example. [3]

e) State the principle of optimality. [2]

f) Write control abstraction algorithm of greedy method. [3]

g) Find the sum of subsets for the following set of integers by using fixed tuple method
$\{5, 10, 25, 50, 100\}$ for $W = 75$ [2]

h) What do you mean by dynamic program? [3]

i) Define P, NP, NP-Complete and NP- Hard. [2]

j) Write the non deterministic sorting algorithm. [3]

Part-B (50 Marks)

2.a) Derive the time complexity of quick sort in an average case.

b) Write an Euclid's algorithm. [5+5]

OR

3.a) Write an algorithm of Merge sort.

b) Solve the following recurrence relation
$T(n) = 4T(n/3) + n^2$. [5+5]

4.a) Write an algorithm of AND/OR graph traversal.

b) Explain how BFS can be used to identify the connected components in a graph with an example. [5+5]

OR

5.a) Write an algorithm to find the strongly connected components in a digraph.

b) Explain the properties of Bi - connected components. [5+5]

6.a) Find an optimal solution to the 0/1 knapsack instance n=7, m=15,
$(p1, P2, ...P7) = (10, 5, 15, 7, 6, 18, 3)$ and
$(w1, w2......w7) = (2, 3, 5, 7, 1, 4, 1)$

b) Write an algorithm for single source shortest path. [5+5]

OR

7.a) Obtain all pair shortest paths for the following graph:
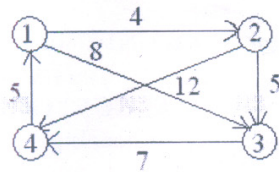
b) Write an algorithm for job sequencing with deadlines. [5+5]

8.a) Explain how the Hamiltonian circuit problem is solved by using the backtracking concept.

b) Write an algorithm of FIFO Branch and Bound. [5+5]

OR

9. Draw the portion of the state space tree generated by LCBB for the following knapsack instances:

n=5, $(P_1, P_2, P_3, P_4, P_5) = (W_1, W_2, W_3, W_4, W_5)= (4, 4, 5, 8, 9)$ and m=15 .

[10]

10.a) Show that the Hamiltonian-path problem is NP-complete.

b) Write a non deterministic sum of subsets problem. [5+5]

OR

11.a) Explain satisfiability problem and write the algorithm for the same.

b) Is travelling salesman problem NP-hard or NP-Complete? Justify your answer.

[5+5]

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