

Code: 13A05406

B.Tech II Year II Semester (R13) Regular & Supplementary Examinations May/June 2016

DESIGN & ANALYSIS OF ALGORITHMS

(Common to CSE and IT)

Time: 3 hours

Max. Marks: 70

PART – A

(Compulsory Question)

- 1 Answer the following: (10 X 02 = 20 Marks)
 - (a) Define an Algorithm. What are the properties of an Algorithm?
 - (b) Compare two functions n^2 and $2^n/4$ for various values of n . Determine when the second function becomes larger than first.
 - (c) State the KNAPSACK Problem. What is the difference between KNAPSACK AND 0/1 KANAPSACK problem.
 - (d) Define Principle of Optimality. What is the essential difference between Greedy method and Dynamic Programming?
 - (e) Draw the possible binary search trees with the numbers 1, 2, 3, 4, 5, 6, 7 such that the height of the binary search tree must be 6.
 - (f) What are the differences between Backtracking and Branch and Bound Algorithm design techniques?
 - (g) What is the use of Comparison trees? Construct a comparison tree for sorting 3 items.
 - (h) Find the time complexity by solving the following recurrence relation.

$$T(n) = 2T(n/2) + n, n > 1$$

$$T(n) = 1, n = 1$$
 - (i) Define P and NP class of Problems.
 - (j) Define NP-complete and NP-Hard class of Problem.

PART – B

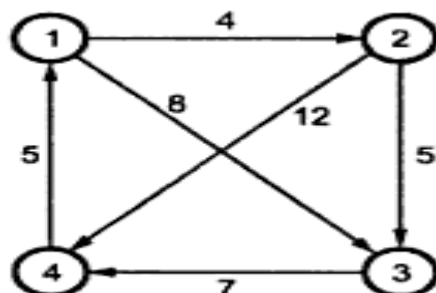
(Answer all five units, 5 X 10 = 50 Marks)

UNIT – I

- 2 Sort the elements 310, 285, 179, 652, 351, 423, 861, 254, 450, 520 using merge sort algorithm and draw the tree of calls of merge sort.
- OR
- 3 Design an algorithm for finding maximum and minimum of a list of elements and illustrate with an example.

UNIT – II

- 4 Find the Optimal solution to the Knap sack instance of $n = 7$, $m = 15$ ($p_1, p_2, p_3, p_4, p_5, p_6, p_7$) = (10, 5, 15, 7, 6, 18, 3) and ($w_1, w_2, w_3, w_4, w_5, w_6, w_7$) = (2, 3, 5, 7, 1, 4, 1) by using Greedy strategy.
- OR
- 5 Design an algorithm for All pairs of shortest path and calculate shortest path between all pairs of vertices by using dynamic programming method for the following graph.



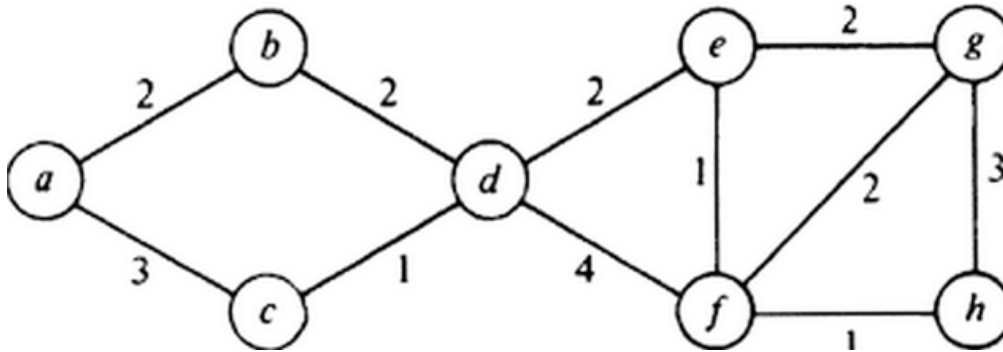
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UNIT – III

- 6 Design a backtracking search algorithm for N-queens problem. Find the positions of 4 queens on a 4X4 chessboard.

OR

- 7 Design an algorithm for Breadth first search. Identify the Breadth first traversal sequence of vertices for the following graph.



UNIT – IV

- 8 State 0/1 knapsack problem and design an algorithm of LC Branch and Bound and find the solution for the knapsack instance of $n = 4$; $(p_1, p_2, p_3, p_4) = (10, 10, 12, 18)$; $(w_1, w_2, w_3, w_4) = (2, 4, 6, 9)$ and $M = 15$.

OR

- 9 State travelling salesperson problem. Apply Branch and Bound algorithm to solve the TSP instantiated by the following cost matrix.

∞	20	30	10	11
15	∞	16	4	2
3	5	∞	2	4
19	6	18	∞	3
16	4	7	16	∞

UNIT – V

- 10 State and prove Cook's theorem.

OR

- 11 State and prove 3-satisfiability problem is NP-Complete.
