LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – **MATHEMATICS**

FIRSTSEMESTER – APRIL 2017

16PMT1MC04- COMPUTER ALGORITHMS

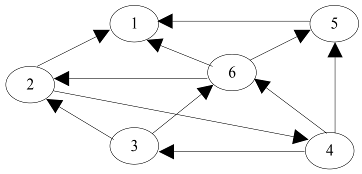
Date: 04-05-2017 Dept. No. Max. : 100 Marks
TIME 09:00-12:00

Answer ALL the Questions:

1. a) Explain the pseudo code convention to describe loop structures. (5)

OR

b) Define the terms Adjacency lists and Adjacency multilist. Obtain the Adjacency lists and Adjacency multilist for the following graph.



(5)

c) Define a stack and a circular queue. State procedures to add and delete an item from a stack and a circular queue. (15)

OR

d) Give HEAPSORT to sort numbers in an array. Simulate it on $A(1:6) = (14, 17, 25, 12, 13, 17)$. (15)

2. a) Write the control abstraction for DIVIDE and CONQUER strategy. (5)

OR

b) Draw the tree of calls of MERGE and MERGESORT when $n = 10$. (5)

c) State algorithm QUICKSORT. Simulate it on $A(1:8) = (65, 70, 75, 80, 60, 55, 50, 45)$. (15)

OR

d) Write algorithm PARTITION. Simulate it on $A(1:15) = (33, 15, 22, 67, 78, 12, 100, 80, 40, 10, 99, 29, 51, 77, 30)$. (15)

3. a) Explain Job sequencing problem with deadlines. (5)

OR

b) Give an algorithm to generate a 2-way merge tree. (5)

c) State procedure GREEDY-KNAPSACK. If $p_1/w_1 \geq p_2/w_2 \geq \cdots \geq p_n/w_n$, then prove that the algorithm GREEDY-KNAPSACK generates an optimal solution to given instance of the knapsack problem. (15)

OR

d) Explain the optimal storage on tapes problem. With usual notations, prove that if $l_1 \leq l_2 \leq \cdots \leq l_m$, then the ordering $i_j = j$, $1 \leq j \leq n$ minimizes $\sum_{i=1}^{n} \sum_{j=1}^{k} l_{i_j}$ overall possible permutations of i_j. (15)

4. a) Give two different formulation for sum of subsets problem. (5)

OR

b) Explain the postorder traversal with an example. (5)

c) Explain in detail the 4-queens problem. Give a backtracking algorithm to solve the *n*-queens problem. (15)

OR

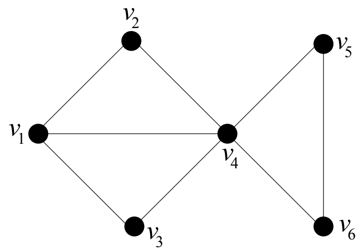
d) State procedure Breadth first search and Depth first search. (15)

5. a) Give a non-deterministic sort algorithm. (5)

OR

b) Define the terms 'Polynomially solvable' and 'NP-complete'. (5)

c) Explain the node cover decision problem with an example. Determine the minimum node cover for the following graph.



Prove that the node cover decision problem is NP-Complete. (15)

OR

d) What is satisfiability problem? State Cook's theorem. Prove that CNF-satisfiability reduces to clique decision problem. (15)

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