Code No. 2354 / N

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I-Semester (New)(Main) Examination, November / December 2012

Subject : Design and Analysis of Algorithms

Time : 3 Hours **Max. Marks: 75**

Note: Answer all questions of Part - A and answer any five questions from Part-B.

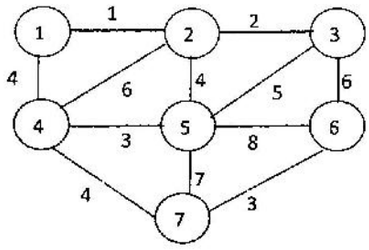
PART – A (25 Marks)

1. Show the following: (3)
   (a) $10n^2 + 9 \neq O(n)$ (b) $n^3 + 10n^2 = \Theta(n^3)$
2. Solve the recurrence: $T(n) = 6T(n/3)+n^2 \log n$ (3)
3. Write the control abstraction for Greedy approach. (2)
4. What is principle of Optimality? (2)
5. Explain traveling salesperson problem. (3)
6. What is meant by Satisfiability? (2)
7. What is Hamiltonian cycle? (2)
8. What is DFS and list its applications? (2)
9. Define the properties of LC-Search. (3)
10. Find an optimal binary merge pattern for files whose lengths number of records are 2, 5, 7, 9, 12, 13, 15 (3)

PART – B (5x10=50 Marks)

11.(a) What are the collision resolution policies in hashing? Write an algorithm for hashing with linear probing. (5)
   (b) Sort the following numbers 3, 16, 12, 14, 11, 15 using Heap sort. Show the step by step procedure. (5)

12.(a) Write a recursive algorithm for finding both the minimum and maximum elements in an array A of n elements. What is the running time? (5)
   (b) Define spanning tree and explain Kruskal's algorithm for finding Minimum Spanning Tree of the graph using the graph given below and write its time complexity. (5)



13. Write recurrence relations for solving OBST using dynamic programming and construct the tree for given data: (10)
   n=4, (a_1, a_2, a_3, a_4) = (end, goto, print, stop)
   p(1:4)=(1/20, 1/5, 1/10, 1/20) q(0:4)=(1/5, 1/10, 1/5,1/20, 1/20)
   Where Ps are probability of successful search and qs are probability of unsuccessful search.

14.(a) Write an algorithm for n Queens using backtracking approach. (7)
   (b) Explain FIFO Branch and Bound. (3)

15.(a) Explain what are NP-Hard and NP-Complete problems. (5)
   (b) Explain node cover decision problem. (5)

16.(a) Write an algorithm for in place partitioning of elements, taking first element of an array as pivot element. (5)
   (b) Find an optimal solution to 0/1 knapsack when (5)
   (w_1, w_2, w_3, w_4)=(10, 15, 6, 9)
   (p_1, p_2, p_3, p_4) = (2, 5, 8, 1)
   Knapsack capacity = 25 where Wi's are weights and Pi's are profits.

17. Write a short note on : (5+5)
   (a) Optimal storage on tapes (b) Multistage graphs

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