Total No. of Questions : 10] [Total No. of Printed Pages : 4

Roll No. 0502CS091004

CS/IT–404(N)

B. E. (Fourth Semester) EXAMINATION, June, 2011

(Common for CS & IT Engg. Branch)

ANALYSIS AND DESIGN OF ALGORITHMS

Time : Three Hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt *one* question from each Unit. Assume suitable data wherever necessary. All questions carry equal marks.

Unit – I

1. (a) Find the O-notation for the function : 6

$$f(n) = 5n^3 + n^2 + 3n + 2$$

(b) Illustrate the operation of Max-Heapify on the array : 14

A = (27, 17, 3, 16, 13, 10, 1, 5, 7, 12, 4, 8, 9, 0)

Or

2. (a) What is the difference between debugging and profiling ? 5

(b) Explain Strassen's matrix multiplication algorithm with example. 10

(c) What is asymptotic notations ? Explain each. 5

P. T. O.

Unit – II

3. (a) Consider the graph G = (V, ∈) given below. 12

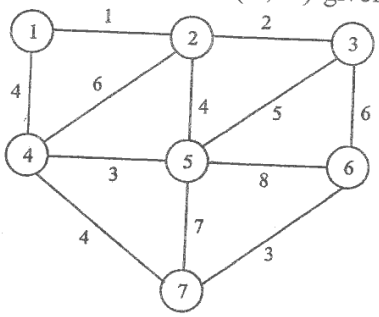

Fig. 1

Find the minimum spanning tree by Prim's algorithm.

(b) Explain the Greedy strategy. Write algorithm for Greedy strategies for Knapsack problem. 8

Or

4. (a) What is the optimal Huffman code for the following set of frequencies based on first 8 Fibonacci numbers : 10

$a : 1 \quad b : 1 \quad c : 2 \quad d : 3 \quad e : 5 \quad f : 8 \quad g : 13 \quad h : 21$

(b) There are 5 jobs whose profits $(P_1 \ldots P_5) = (20, 15, 10, 1, 6)$ and deadlines $= (2, 2, 1, 3, 3)$. Find the optimal solution that maximises profit on scheduling these jobs. Discuss its algorithm too. 10

Unit – III

5. (a) Define how Knapsack problem is solved by using dyanamic programming approach.

Consider $n = 3$ $(w_1, w_2, w_3) = (2, 3, 3)$,

$(P_1, P_2, P_3) = (1, 2, 4)$ and $M = 6$.

Find optimal solution for the given data. 10

(b) What is dynamic programming ? Discuss the elements of dynamic programming. How does the dynamic programming differ from Greedy algorithm ? 10

Or

6. (a) Find all pair shortest path using Floyd Marshall algorithm for the given graph. 12

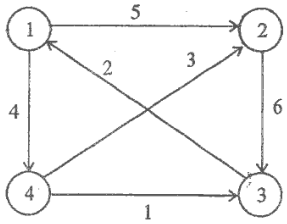

Fig. 2

(b) Explain multistage graph problem with example. 8

Unit–IV

7. (a) Explain Backtracking. Discuss the n-queen problem with its algorithm. 10

(b) What is Hamiltonian cycle ? Write an algorithm to find all Hamiltonian cycles in a graph. 10

Or

8. (a) Explain Graph Coloring problem. 6

(b) Solve the TSP problem having the following cost matrix using branch and bound technique : 10

	A	B	C	D
A	×	5	2	3
B	4	×	2	3
C	4	2	×	3
D	7	6	8	×

(c) Discuss parallel algorithm briefly. 4

P. T. O.

Unit – V

9. (a) Obtain height balanced trees starting with empty tree on the following set of instructions :
December, January, April, March, July, August, October, February, November, May, June 10

(b) Implement the B-tree search algorithm to search K = 12 in the below given B - tree. 10

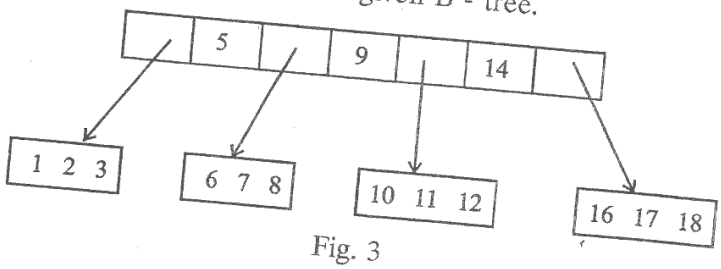

Fig. 3

Or

10. (a) What are 2-3 trees and B-trees ? Explain with example. 10

(b) Write BFS and DFS algorithms and also analyse the running time of algorithm. 10