

CS/IT-404(N)

B. E. (Fourth Semester) EXAMINATION, Dec., 2010

(New Scheme)

(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. All questions carry equal marks.

Unit – I

1. (a) Consider the following recurrence : 8

$$T(n) = 4 T \left(\left\lfloor \frac{n}{2} \right\rfloor \right) + n$$

Obtain the asymptotic bound using recurrence tree method.

- (b) Explain Heap sort algorithm. Create a Min-Heap and Max. Heap for the following list : 12

$$L = \{G, F, D, C, B, A, H, I, J, K\}$$

Or

2. (a) Show that quick sort's best case running time is $\Omega(n \log n)$. 10

- (b) Sort the list 70, 80, 40, 50, 60, 12, 35, 95 by using

<http://www.rgpvonline.com>
Merge sort.

10

Unit – II

- (a) Find an optimal solution for the Knapsack problem :
 $n = 7$, $M = 15$ $(P_1, P_2, \dots, P_7) = (10, 5, 15, 7, 6, 18, 3)$
 and $(\omega_1, \omega_2, \dots, \omega_7) = (2, 3, 5, 7, 1, 4)$. 10
- (b) Explain greedy algorithm for the minimum cost spanning trees. 10

Or

- (a) Compute the minimum travel cost for the given graph G. 10

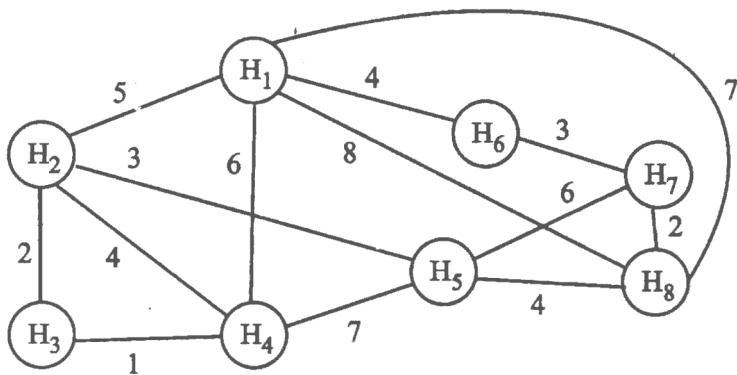


Fig. 1

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

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

Unit – III

- (a) Write an algorithm to find all-pair shortest path. Derive its complexity. 10
- (b) Explain Reliability design problem. 10

Or

- (a) What is the difference between Greedy Knapsack and 0/1 Knapsack. Show that 0/1 Knapsack solution not be an optimal solution. 10

- (b) Explain dynamic programming. Explain multistage graph algorithm briefly. 10

Unit – IV

7. (a) Find a Hamiltonian circuit using backtracking method. 10

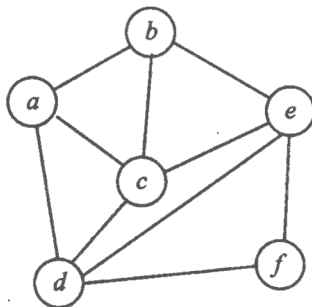


Fig. 2

- (b) Solve Travelling Salesperson problem by using Branch and Bound technique with example. 10

Or

8. (a) Explain Graph Coloring problem with example. 10
 (b) What do you mean by FIFO Branch and Bound algorithm and LC search algorithm ? Explain briefly. 10

Unit – V

9. (a) Consider three keys k_1, k_2, k_3 such that $k_1 < k_2 < k_3$. A binary search tree is constructed with these three keys. Depending on the order in which the keys are inserted, five different Binary search trees are possible. Write down the five binary search trees. 10
 (b) Write BFS algorithm and analyse the running time of algorithm. 10

Or

10. (a) Insert these keys into an AVL tree : 10
<http://www.rgpvonline.com>
 342, 206, 444, 523, 607, 301, 142, 183, 102, 157 and 149

(b) Perform the deletion operation in the given β -tree.

<http://www.onlineqp.com>

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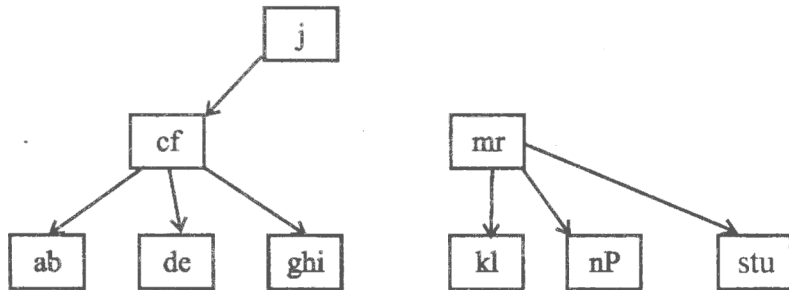


Fig. 3

delete b, m, n, e, c in sequence.