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Printed Pages : 3

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BT–6/M12

ANALYSIS AND DESIGN OF ALGORITHM

Paper–IT–352

Time allowed : 3 hours] *[Maximum marks :100*

Note : *Attempt any five questions in all, selecting at least one question from each unit.*

Unit–1

1. (a) What is Asymptotic Notation ? Explain Theta, Big O and Omega notation. 4

(b) Find the running time complexity of following code :

```
for i = 1 to n do
    k1
    for j = 1 to i do
        for k = 1 to i do
            k2.
```

2

(c) Prove log (n!) = O (n log n). 4

2. (a) Sort using quick sort the following series :

2, 7, 1, 3, 5, 6, 4, 8 5

(b) Prove that merge sort has complexity O (n $\log_2$ n) using Divide and Conquer Recurrence Relation. 5

Unit–2

3. (a) What do you mean by single source shortest path ? State and explain Bellman-Ford algorithm for single source path. 6

   (b) Explain how Knapsack problem provides Approximate Solution ? 4

4. (a) Differentiate between dynamic programming and divide and conquer method. 4

   (b) Write down algorithm for Matrix-Multiplication for recursive solution. How it makes your algorithm dynamic ? 6

Unit–3

5. Explain 8 Queen problem with back-tracking. Find all solution space for given problem. Write Pseudo code and explain it with tree structure. 10

6. (a) Apply 0/1 Knapsack to find optimal solution such that n = 7, m = 15.

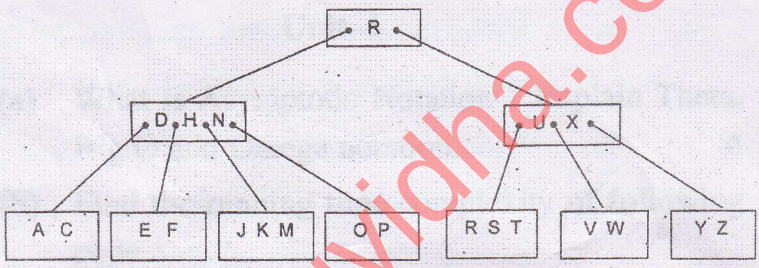
   (p1, p2, p3, p4, p5, p6, p7) = (10, 5, 15, 7, 6, 18, 3) and (w1, w2, w3, w4, w5, w6, w7) = (2, 3, 5, 7, 1, 4, 1). 5

   (b) Explain FIFO Branch and Bound. 5

Unit–4

7. (a) Differentiate between Depth First Search and Breadth First Search. 3

(b) Consider the following B-Tree with t = 3. Show how H is deleted from this and then how L is inserted. 2



(c) Write Pseudo code to delete any key from Binary Search Tree. 5

8. Write short note on :

(a) B^+ Tree

(b) NP-Hard

(c) NP-Complete

(d) Cook's Theorem. $4 \times 2\frac{1}{2} = 10$