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24269-C

B.C.A. (Fourth Semester)

Examination, 2024

Paper : I

BCA-401

(Design and Analysis of Algorithm)

Time : Three Hours] *[Maximum Marks : 70*

Note : Attempt questions from **all** sections as per instructions.

Section-A

(Very Short Type Questions)

Note : Attempt all parts of this question. Give answer of each part in about 50 words.

10×1.5=15

1. (a) What is performance measurement?

   (b) Define the asymptotic notation "Big O".

(c) What is Binary Search?

(d) What do you mean by the optimal solution?

(e) Write the difference between the Dynamic programming and Greedy method.

(f) What is the 0/1 knapsack problem?

(g) What is the time complexity of backtracking algorithm?

(h) What is meant by n-queens Problem?

(i) What is Branch and bound?

(j) What is Minimum Spanning Tree?

Section-B

(Short Type Questions)

Note : Attempt all questions. Give answer of each question in about 200 words.

7×5=35

2. What do you mean by complexity of an algorithm? Explain worst case complexity and average case complexity.

OR

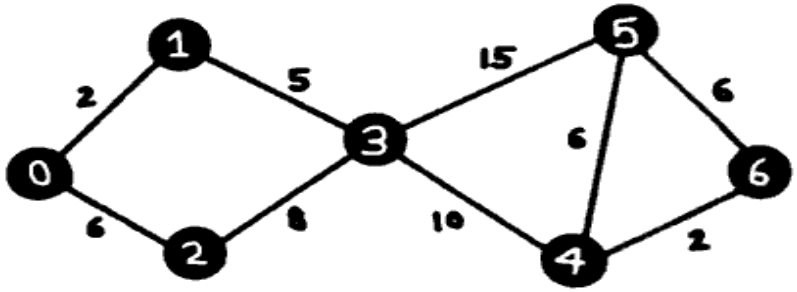
For $T(n)=7T(n/2)+18n^2$ Solve the recurrence relation and find the time complexity.

3. Trace the merge sort algorithm to sort the following elements.

41, 32, 11, 92, 66, 74, 87, 38.

OR

Find the shortest distance from node 1 to all other nodes using Dijkastra's algorithm.



4. Explain difference between Prim's and Kruskal's Minimum spanning Tree algorithm. Derive the time complexity of Kruskal's algorithm.

OR

Find an optimal solution to the Knapsack instance n=7 objects and the capacity of kanpsack m=15. The profits and weights of the objects are (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. Among Merge sort, Insertion sort and Bubble sort which sorting technique is the best in worst case. Support your arguments with an example and analysis.

OR

What do you mean by dynamic programming? Explain with the help of suitable examples.

6. Give the solution to the 8 queen's problems using backtracking.

OR

What is principle of optimality? Explain how Travelling Salesman problem uses the dynamic programming technique with example.

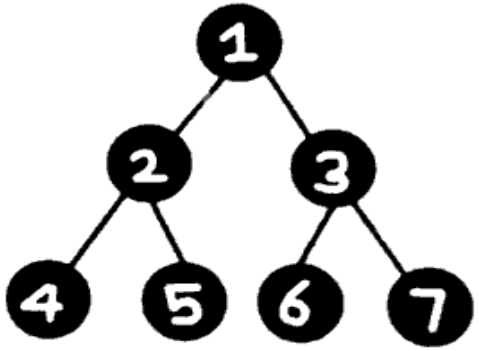
Section-C

(Long Answer Type Questions)

Note : Answer any two questions. Give answer of each question in about 500 words.

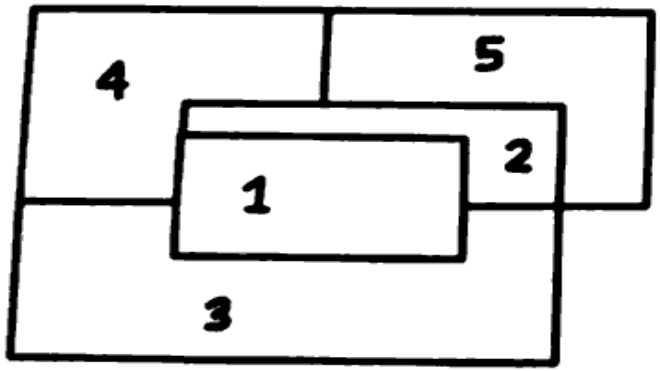
10×2=20

7. Write recursion algorithm for pre-order traversal and apply it to the following complete binary tree.



8. Find the greedy solution for following job sequencing with deadlines problem n=7, (p1, p2, p3, p4, p5, p6, p7)=(3, 5, 20, 18, 1, 6, 30), (d1, d2, d3, d4, ..., d7)=(1, 3, 4, 3, 2, 1, 2)

9. What is graph coloring problem? Describe the Back Tracking technique to m-coloring with following planer graph showing in following figure.



10. Explain how the removing condition is done from the conditional Asymptotic notation with an example.

11. Write short notes on any two of the following:

    (a) Designing Algorithm

    (b) Optimal Storage on tapes

    (c) Chromatic number