A   Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code: U5C01

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2023

Fifth Semester

Computer Science and Business Systems

21UCB501-DESIGN AND ANALYSIS OF ALGORITHM

(Regulations 2021)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. What is an algorithm?   CO1-U

    (a) Flowchart   (b) Pseudo code

    (c) Decision   (d) Step by step instructions used to solve the problem

2. What is the best-case time complexity of finding a specific element in   CO1-U
    an unsorted array using linear search?

    (a) $O(n)$ (b) $O(1)$ (c) $O(\log n)$ (d) $O(n^2)$

3. Topological sorting is applicable to which type of graphs?   CO1-U

    (a) Searching for an element in a linked list.

    (b) Searching for an element in an unsorted array.

    (c) Searching for an element in a sorted array.

    (d) Searching for an element in a balanced binary search tree.

4. What is the main advantage of using binary search over linear search?   CO1-U

    (a) Binary search works faster for small arrays.

    (b) Binary search can handle unsorted arrays.

    (c) Binary search has a lower time complexity for large datasets.

    (d) Binary search requires less memory.

5. Which of the following algorithms is an example of a greedy   CO1-U
    algorithm?

    (a) Kruskal's algorithm   (b) Searching   (c) Dynamic Programming   (d) Quick Sort

6. Which of the following is a dynamic programming problem?   CO1-U

   (a) Longest Common Subsequence   (b) Binary Search

   (c) Depth First Search   (d) None of the above

7. Which of the problems cannot be solved by backtracking method?   CO1-U

   (a) n-queen problem   (b) subset sum problem

   (c) hamiltonian circuit problem   (d) travelling salesman problem

8. Which of the following methods can be used to solve the Knapsack problem?   CO1-U

   (a) Brute force algorithm   (b) Recursion

   (c) Dynamic programming   (d) Brute force, Recursion and Dynamic Programming

9. Which of the following problems is not NP complete?   CO1-U

   (a) Hamiltonian circuit   (b) Bin packing

   (c) Partition problem   (d) Halting problem

10. The choice of polynomial class has led to the development of an extensive theory called _____   CO1-U

    (a) computational complexity   (b) time complexity

    (c) problem complexity   (d) decision complexity

PART – B (5 x 2= 10Marks)

11. Give the Euclid's Algorithm for computing GCD(44,17)?   CO2-App

12. 14,33,26,11,8.Sort the given elements using Merge Sort Algorithm   CO2-App

13. Find an optimal Huffman Code for the following set of frequencies: CO3-Ana

    a: 50   b: 25   c: 15

14. List the procedure used in recursive backtracking algorithm.   CO1-U

15. Write the difference between Deterministic & Non Deterministic algorithms with an example.   CO1-U

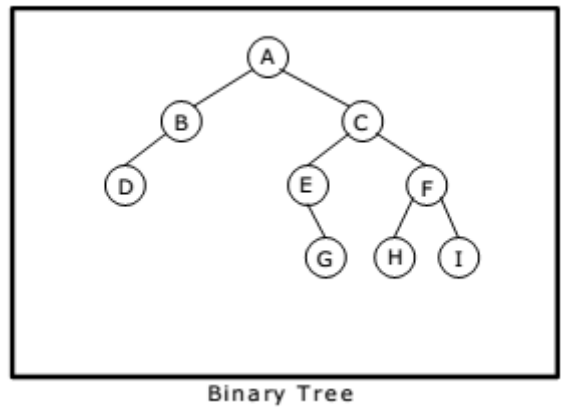### PART – C (5 x 16= 80Marks)

16. (a) Solve Recurrence Relation   CO2-App   (16)
    a) $T(n) = 2T(n/2) + n/\log^2 n$
    b) $T(n) = 8T(n/2)+n^3$
   c) $T(n) = 4T(n/2)+n$
    d) $T(n)=8T(n/2)+n$

Or

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(b) Calculate the GCD (14828, 24486) by applying Euclid's   CO2-App   (16)
algorithm, Consecutive Integers Checking and Middle School
Method.

17. (a) Consider the following binary search tree and perform Preorder,   CO2-App   (16)
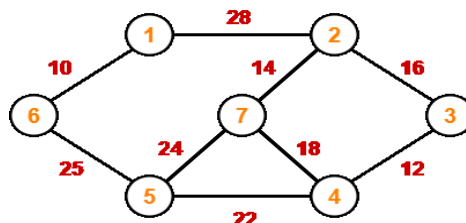Postorder,Inoder traversal.

Binary Tree

Or

(b) (i) Explain Post Order ,Inorder and Pre order for the Binary Tree   CO2-App   (16)
Traversal
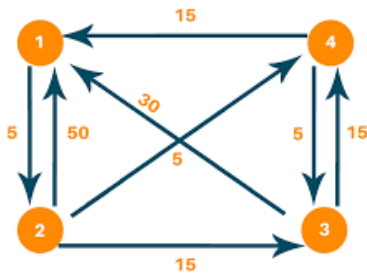(ii) Perform Post Order ,Inorder and Pre order for the given
Binary Tree Traversal
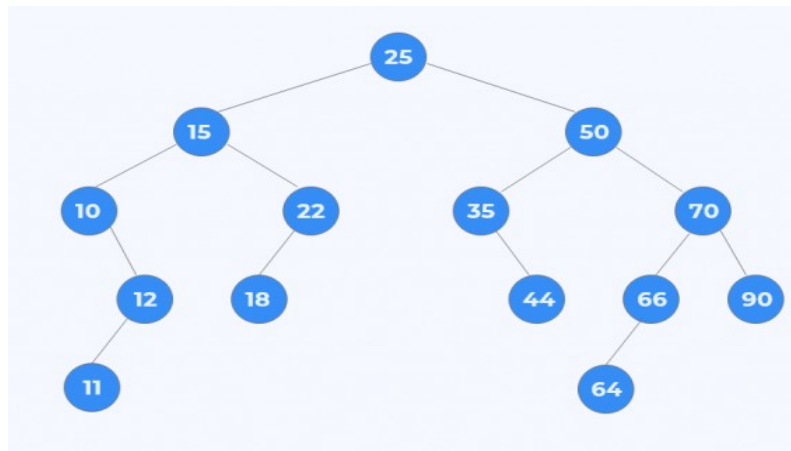
18. (a) Construct the minimum spanning tree (MST) for the given graph   CO2-App   (16)
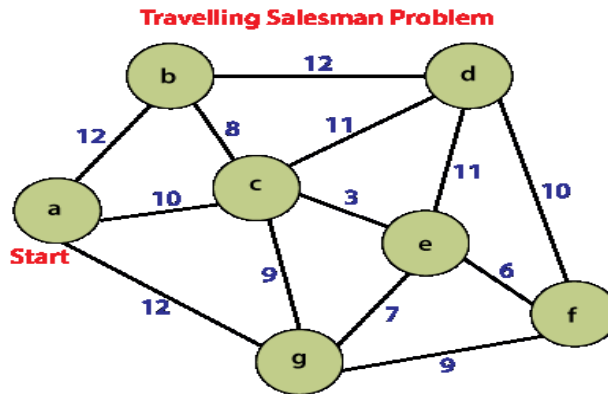using Kruskal's Algorithm-

Or

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(b) Using Floyd Warshall Algorithm, find the shortest path distance   CO2-App   (16)
between every pair of vertices

19. (a) Apply the branch-and-bound algorithm to solve the travelling   CO2-App   (16)
sales man problem for the following graph.

Or

(b) Consider knapsack problem: n = 8. (W1, W2, W3, W4, W5, W6,   CO2-App   (16)
W2, W8) = (1, 11, 21, 23, 33, 43, 45, 55), P = (11, 21, 31, 33, 43,
53, 55, 65), m = 110. Solve the problem using backtracking
approach.

20. (a) Differentiate NP hard and NP complete problems with its   CO1-U   (16)
algorithm analysis

Or

(b) Describe in detail about the steps involved in the Vertex Cover   CO1-U   (16)
Algorithm with an example

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