Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U1301

M.E. DEGREE EXAMINATION, APRIL/ MAY 2025

First Semester

Computer Science and Engineering

21PCS101 - ADVANCED DATA STRUCTURES AND ALGORITHMS

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

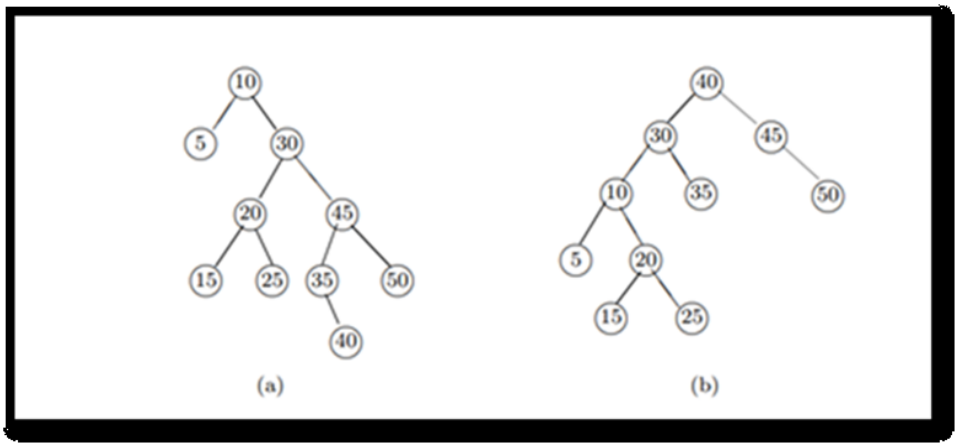
Answer ALL Questions

PART A - (10 x 2 = 20 Marks)

1.	Describe elementary Data Structures	CO1- U
2.	List out the applications of Binary Search Tree.	CO1- U
3.	List out the applications of Heap.	CO1- U
4.	Differentiate Min heap and max Heap.	CO1- U
5.	Generate the hash value for the given sequence of keys 50, 700, 76, 85, 92, 73, and 101 with the hash function as "key mod 7".	CO2 - App
6.	Construct the hash table by inserting the following keys 12, 18, 13, 2, 3, 23, 5 and 15 into an initially empty hash table of length 10 using both the hash table techniques.	CO2 - App
7.	Define graph. How it differs from Tree?	CO1- U
8.	What are all the methods used to represent Graph and give the advantages and Disadvantages of both representation.	CO1- U
9.	Define Randomized Algorithms. How to analyze Randomized Algorithms?	CO1- U
10.	What is the best algorithm used to solve travelling Salesman Problem? Justify your answer.	CO1 - U

PART B - (5 x 16 = 80 Marks)

11.	(a)	Assume that the tree given in (b) is obtained from the tree in (a) by doing a splay tree operation. What are the various possible splay tree operations, such as insert (k), delete (k), etc., on tree in (a) that lead to the tree in (b)?	CO2 - App	(16)



Or

(b) Show the results of inserting the keys F, S, Q, K, C, L, H, T, V, W, M, R, N, P, A, B, X, Y, D, Z, E in the sequence of order with minimum degree 2. Show the results of deleting C, P, and V from the tree and Write the procedure for insertion and Deletion operations. CO2 -App (16)

12. (a) Assume that items a through m with keys 3,5,2,7,4,10,8,6,3,6,1,2,9 inserting in alphabetical order into a Fibonacci heaps. Show the heap following the insertions. Then do a deletemin() and show the resulting heap state. Write for insertion and deletion of Fibonacci heap. CO2 - App (16)

Or

(b) Construct the Binomial heap for the following sequence of numbers 7,2,4,17,1,11,6,8,15,10,20. Also apply the operation of extracting the minimum key in the resulting binomial Heap. Write the procedure for insertion and deletion of binomial heap. CO2 - App (16)

13. (a) Explain in detail Collision Resolution Techniques with suitable example. CO1 - U (16)

Or

(b) Briefly discuss about concurrent heap with suitable example CO1- U (16)

14. (a) Select suitable Greedy Paradigm Techniques to construct MST with an example. CO1 - U (16)

Or

(b) Explain in detail Edmond-Karp maximum-flow algorithm with suitable example. CO1 - U (16)

15. (a) Consider this minimal vertex cover problem: given a graph G = (V, E), find a minimal set of vertices S such that for every edge (u,v) ∈ E, u or v (or both) are in S. CO2 - App (16)

Or

(b) A sequence of n candidates for a position – Each has a distinct quality rating that we can determine in an interview. CO2 –App (16)

Given data:

We know total ranking of interviewed candidates, but not with respect to candidates left to interview

Calculate the probability to hire the best qualified candidate given k?

Calculate the best value of k to maximize above probability?

Discuss in detail online Hiring problem