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

Question Paper Code: U1301

M.E. DEGREE EXAMINATION, NOV/DEC 2024

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.	Differentiate Binary search tree and B tree.	CO1-U
2.	Find BST for an data (b,e,a,c,f,d) and delete the node 'b','c' successfully	CO2- App
3.	List out the applications of Heap.	CO1-U
4.	How leftist heap differ from skew 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.	Write a C program for Concurrent hashing	CO1- U
7.	Define graph. How it differs from Tree?	CO1- U
8.	Difference between Prim's Algorithm and Kruskal's Algorithm	CO1- U
9.	Define Randomized Algorithms.	CO1- U
10.	Write non recursive algorithm for the Tower of Hanoi puzzle	CO1 - U

PART B - (5 x 16 = 80 Marks)

11.	(a)	Build an AVL tree with the following values: 15, 20, 24, 10, 13, 7, 30, 36, 25 and show the Result of removing 24 and 20 from constructed tree. What is the maximum height of any AVL- tree with 7 nodes? Assume that the height of a tree with a single node is 0.What is the worst case possible height of AVL tree? Analyze the time complexity of Insertion and Deletion Operation.	CO2 - App	(16)

Or

(b) Consider using a b-tree with minimum degree t = 2. Compare this data structure with a red-black tree. Is this data structure better, worse, or the same as a red-black tree in terms of time complexity? Briefly justify your answer. CO2 -App (16)

12. (a) How will you resolve the collisions, while inserting elements into the hash table using separate chaining and linear probing? Write the routines for inserting, searching and removing elements from the hash table using the above mentioned techniques with suitable example. CO2 - App (16)

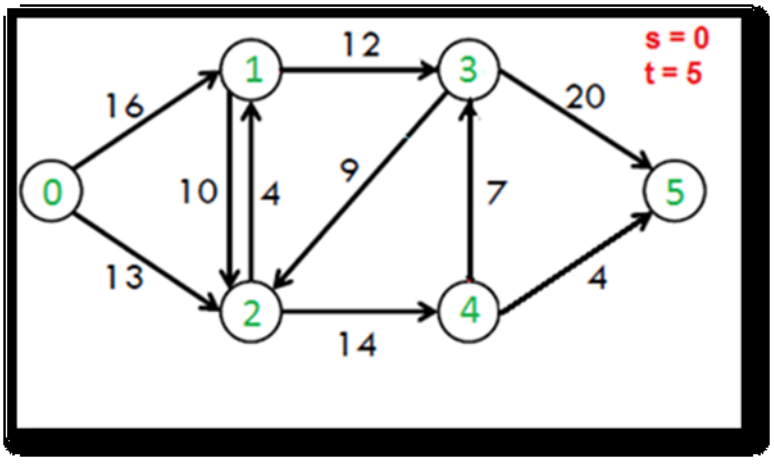
Or

(b) Construct the open hash table and close hash table for the input 30,20,56,75,31,19 using the hash function h(k)=k mod 9 CO2 - App (16)

13. (a) Consider a phone network design. You have a business with several offices; you want to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect 7 pairs of cities. Find a set of lines that connects all your offices with a minimum total cost and explain the algorithm in detail. CO2 - App (16)

Or

(b) Find out the Min Cut for following given problem. Write an algorithm to compute the minimum cut in the graph. CO2 - App (16)



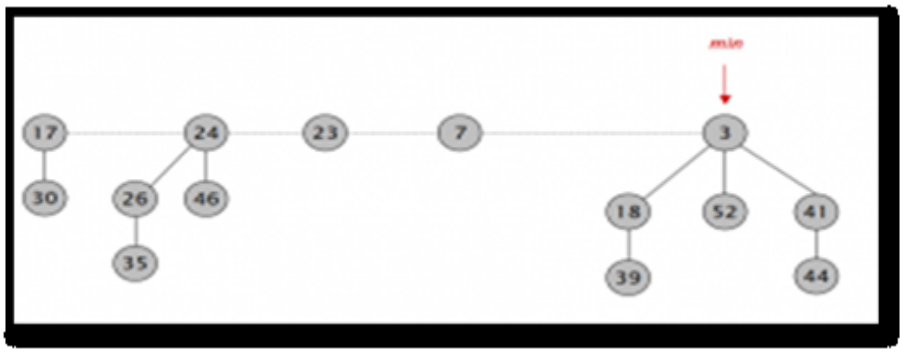
14. (a) Consider this minimal vertex cover problem: given a graph G = (V, E), find a minimal set of vertices S such that for every edge (u,v) ∈ E, u or v (or both) are in S. CO2 - App (16)

Or

(b) Consider that the capacity of the knapsack W = 60 and the list of provided items are shown in the following table. CO2 - App (16)

Item	1	2	3	4
Profit	280	100	120	120
Weight	40	10	20	24
Ratio	7	10	6	5

15. (a) Illustrate about the procedure involved in inserting of the element 21 in the Fibonacci heap below. Perform the following operations: Find Decrease Key from 46 to 29, decrease key from 29 to 15, decrease key from 35 to 5, and delete min operation for the following Fibonacci Heap. CO2 - App (16)



Or

(b) Consider the array A = (29, 18, 10, 15, 20, 9, 5, 13, 2, 4, and 15). Check whether the given Array A satisfies the max heap property. If not, rearrange it to satisfy the max-heap property. Explain the max- heapify procedure and display the maximum element from the given array. CO2 –App (16)