Seat No. _____

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BE SEMESTER-III (CE/IT/CSE) Examination November - 2024

Subject Name: Data Structures and Algorithms
Subject Code: CT303-N

Date: 14/11/2024 **Time: 12:30 pm to 03:30 pm** **Total Marks: 70**

Instructions:

1. Answer each section in separate answer sheet.
2. Use of scientific calculator is permitted.
3. All questions are Compulsory.
4. Indicate clearly, the option you attempt along with its respective question number.
5. Use the last page of main supplementary of rough work.

Section-I

Q-1 **(A)** Define data structures. Write difference between linear and nonlinear data structures. [5]

(B) Convert A*(B+D)/E-F-(G+H/K) infix expression into postfix. Show stack status after every step in tabular form. [5]

(C) What is Stack? List out different operations of stack and also write algorithms for any two operations. [5]

OR

(C) What is recursion? Write a C/C++ program to solve the tower of hanoi problem using recursion. [5]

Q-2 **(A)** Define queue. Explain representation of queue using array. [5]

(B) Write an algorithm to insert and delete an element in a circular queue. [5]

OR

Q-2 **(A)** What is priority queue? Explain insertion and deletion in priority queue. [5]

(B) Write algorithms for implementation of a stack using a linked list. [5]

Q-3 **(A)** Write an algorithm to insert an element at starting and ending in a singly linked list. [5]

(B) Define following terms: [5]

Primitive Data Type → 1. ~~Linked List~~ 2. Complete Binary Tree
3. Sibling 4. Multi Graph
5. Weighted Graph

OR

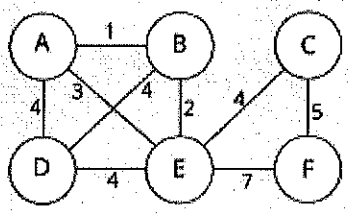
Q-3 **(A)** Create a binary tree for given traversals. Give the postorder traversal for the same. [5]
preorder = {7,10,4,3,1,2,8,11}
inorder = {4,10,3,1,7,11,8,2}

(B) Write a short note on a threaded binary tree. [5]

Section-II

Q-4 **(A)** Create a binary search tree for the following data. Also write all traversals of it. [5]
50 ,75 ,25, 22,60,40,15,90,80,30

(B) Find the MST using Prim's algorithm for the graph shown in figure. [5]

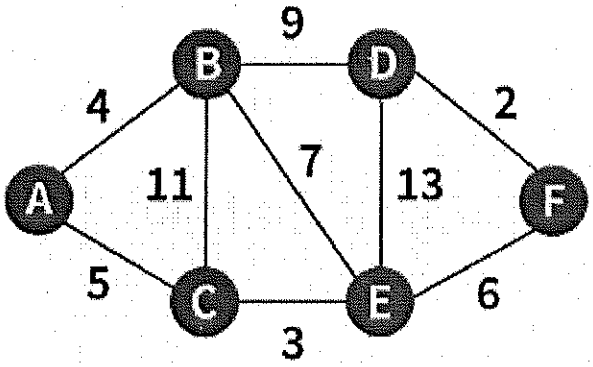


(C) Define AVL tree. Construct AVL tree for 42,06,54,62,88,50,22,32,12. [5]

OR

(C) Which are graph traversal techniques? Explain with an example. [5]

Q-5 **(A)** Find shortest path of given graph using dijkstra's algorithm. A is the source vertex. [5]



(B) Perform quick sort on 26, 5, 37, 1, 61, 11, 59, 15, 48, 19. [5]

OR

Q-5 **(A)** What is the precondition for binary search? Write an algorithm for binary search. [5]

(B) Perform bubble sort on 12, 2, 16, 30, 8, 28, 4, 10, 20, 6, 18. [5]

Q-6 **(A)** What is Hashing? Explain various hashing functions with examples. [5]

(B) Explain multi key file organization in detail. [5]

OR

Q-6 **(A)** Consider a hash table of size 10. Using **linear probing** as collision resolution techniques insert key values 72,27,36,24,63,81,92 into the hash table. [5]

h(k)=k mod m, m=10.

(B) Explain File in the terms of fields, records and database. [5]