Reg No

24027

Velammal College of Engineering and Technology

Viraganoor, Madurai – 625 009
(Autonomous)

B.E./B.Tech. End Semester Examinations November 2024

Third Semester
Time : 3 Hours

Regulation 2021
Max. Marks 100

21CS202 – Data Structures
(Common to CSE and IT branches)

Answer ALL Questions
PART-A (10 x 2 = 20 Marks)

1. Define ADT. State the advantages of ADT.
2. Distinguish between linear and non-linear data structures.
3. What are the various operations performed on the stack?
4. How do you test for an empty queue?
5. Create an expression tree for the expression a*(b+c)+((d+e*f)*g).
6. State the complexity of binary search tree.
7. Why Red-Black tree is preferred for frequent insertions and deletions than AVL tree?
8. List out the collision resolution techniques.
9. Define adjacency matrix.
10. What is topological sort?

Part – B (5 x 13 = 65 marks)

11. a) i. Derive an ADT to perform insertion and deletion in a singly linked list. (7 Marks)
    ii. Design an algorithm to reverse the linked list. Trace it with an example. (6 Marks)

OR

b) Write an algorithm to perform the following polynomial manipulation using linked list representation.

12. a) Write an algorithm for Push and Pop operation on Stack using linked list. Implement a stack using singly linked list

OR

b) Explain the enqueue and dequeue operations performed on a circular queue with suitable algorithm.

13. a) Write an algorithm for inorder, preorder and postorder traversal of a binary tree with suitable example.

OR

b) i. Construct B tree to insert the following key elements 10, 20, 5, 6, 12, 30, 7, 17, 25, 15 (order of the tree is 3). (7 Marks)

ii. Draw a B tree of order 6. (6 Marks)

14. a) Perform insertions and deletions using Red-black tree by inserting the following values: 13, 24, 26, 5, 30, 18, 12, 11, 35, 9, 7, 4 and perform splaying at 5.

OR

b) Explain the various strategies in open addressing. Construct the hash table for the following data with quadratic and double hashing: 4371, 1323, 6173, 4199, 4344, 9679, 1989 with hash function=(x/100) mod 10.

15. a) Explain Breath First Search algorithm with suitable example.

OR

b) What is topological sort? Write an algorithm to perform topological sort with suitable example.

Part – C (1 x 15 marks)

16. a) Develop and Show the simulation using stack for conversion of infix to postfix expression **a+b*c-(d*e)+f** and also evaluate the postfix expression using the values a=12, b=3, c=14, d=5, e=16 and f=7.

OR

b) i. Describe the algorithm used to perform single and double rotation on a AVL tree.

ii. Insert an element in an empty AVL tree from 0 to 10 with suitable rotations.

(7 + 8 Marks)