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P.E.S. College of Engineering, Mandya - 571 401
 (An Autonomous Institution affiliated to VTU, Belagavi)
Third Semester, B.E. - Information Science and Engineering
Semester End Examination; March - 2021

Data Structures

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Write an algorithm to evaluate a valid postfix expression and hence evaluate the postfix expression: $6\ 2\ 3\ +\ -\ 3\ 8\ 2\ /\ +\ \times$. 10
 All the operands are single digit positive integers and operators are binary in nature.
- b. Define Stack. Briefly explain the primitive operations on the stack. 6
- c. Differentiate between iterations and recursive functions. 4
- 2 a. Write a recursive function $fact(n)$ to find the factorial of an integer. Diagrammatically explain, how the stacking and un-stacking takes place during execution for $fact(4)$. 10
- b. Write an algorithm for conversion of infix expression to postfix expression. 6
- c. List and explain the applications of stack. 4

UNIT - II

- 3 a. Give an algorithm;
 i) To delete a node at a specified position for a given singly linked list 10
 ii) To Concatenate two lists
- b. Write a C program to simulate stack using singly linked list and interchange the elements in the list at position m and n and display the list before and after interchanging the elements. 10
- 4 a. Write a C program to perform the following operations on a doubly linked list:
 i) To create the list by inserting a node at the front end 10
 ii) To display all the elements in the reverse order
- b. Implement circular doubly linked list using header nodes with neat diagram. 10

UNIT - III

- 5 a. List out applications of linked list and advantages of doubly linked list over singly linked list. 6
- b. Write a C Program to simulate a priority queue using singly linked list. 8
- c. Write an algorithm for static implementation of circular queue. 6
- 6 a. Write a C program to implement input restricted DQueue. Explain the applications of priority queues. 10
- b. Write a program to evaluate a given polynomial using linked list. 10

UNIT - IV

- 7 a. Write a C program to construct a binary tree and display its content using preorder, postorder and inorder tree traversal methods. 10
- b. List and explain the applications of trees. Construct a expression tree for the following expression: $6 \ 2 \ 3 \ + \ - \ 3 \ 8 \ 2 \ / \ + \ \times$. 10
- 8 a. Write a C function to delete a node from Binary Search tree. 10
- b. If the preorder tree traversal is {1, 2, 4, 8, 9, 5, 3, 6, 7} and post order tree traversal is {8, 9, 4, 5, 2, 6, 7, 3, 1} construct a binary search tree. 10

UNIT - V

- 9 a. Write an algorithm to sort given set of numbers using quick sort. Trace the same for the following set of values: 42, 37, 11, 98, 36, 72, 65, 10, 88, 78. 10
- b. Write an algorithm to sort given set of numbers using simple merge sort. 10
- 10 a. Write an algorithm to search an element using sentinel search. Trace the algorithm by taking appropriate example. 10
- b. Write an algorithm to search an element using probability search. Trace the algorithm by taking appropriate example. 10

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