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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Computer Science and Engineering
Semester End Examination; Dec - 2016/Jan - 2017
Data Structures

Time: 3 hrs   Max. Marks: 100

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

UNIT - I

1 a.	Why we need to convert infix to postfix or prefix notations? Change the infix expression given below to postfix notation. Show each step clearly,	4
	i) $(A + B) * (C – D) * F + C$ \qquad ii) $(A – 2 * (B + C) – D * E) * F$.	
b.	Write a program to evaluate the postfix expression.	12
c.	Write ADT for rational numbers.	4
2 a.	Write recursive program for Tower of Hanoi problem. Trace the program by taking two disks.	8
b.	Write a program to convert prefix to postfix expression.	12

UNIT - II

3 a.	Write an algorithm to perform the following operations :	
	i) To append two circular singly linked list	8
	ii) To find greatest number in singly linked list.	
b.	Write an algorithm to perform the following on DLL :	
	i) To reverse given sting	
	ii) To find frequency of a given integer	12
	iii) To generate a list called prime (List containing only prime numbers) from the main list.	
4 a.	Write a program using SLL to reverse the given list of integer number without creating another list.	8
b.	Write an algorithm to delete and insert a node at a given position with header node using DLL.	8
c.	Differentiate between array and linked list.	4

UNIT - III

5 a.	Write a program to add two polynomials.	12
b.	Consider a node with following information: id, name, address and blood group. Write a program to create a list and display the all names and address of persons whose blood group is specified at runtime using SLL.	8

6 a. Write a program to group the given list of numbers while maintaining their original order. Use queues to implement the same.

Group1: 1 – 10

Group 2 : 11 – 20

Group 3 : 30 – 40

Group 4 : Greater than 40   12

Example: if input is : 79, 46, 12, 48, 3, 14, 32, 11, 2, 10

output : group 1 – 3, 2, 10

        group 2 – 12, 14, 11

        group 3 – 32

        group 4 – 79, 46, 48

  b. List and explain basic queue operations with example.   4

  c. Write an algorithm to insert an element into a queue.   4

UNIT - IV

7 a. Define the following with example,   6

i) Binary tree   ii) Height of a tree   iii) Complete binary tree   iv) Balance factor.

  b. Draw all possible binary search trees for the data elements 5, 9 and 12.   4

  c. Write an algorithm for the following operations on binary search tree,

i) Delete an element from BST   10

ii) To find smallest node.

8 a. Draw expression tree and find prefix and postfix expression for the following infix expression, (C + D + A * B) * (E + F).   6

  b. Write an algorithm to insert an element into threaded binary tree.   8

  c. List and explain the properties of binary tree and also give the operations that can be performed on binary tree with an example.   6

UNIT - V

9 a. Write a program to sort the elements using merge sort method.   10

  b. Given a list of number, sort them using quick sort. Show the steps clearly,   10

List : 45, 78, 93, 46, 74, 2, 15, 8.

10 a. Write a program to search for the given data using probability search.   10

  b. Write a program to search whether the given name is present in the list of 'N' names using binary search method.   10

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