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

(An Autonomous Institution affiliated to VTU, Belgaum)

Third Semester, B.E. - Information Science and Engineering

Semester End Examination; Dec. - 2015

Data Structures

Time: 3 hrs *Max. Marks: 100*

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

UNIT - I

1 a. What is stack? Mention the operations that are performed to put an element on to a stack and remove an element from a stack, using C language. Write the algorithm for the above functions. 8

b. Write an algorithm for evaluating a valid post fix expressions. Trace the same on indicating content of stack for expression:

AB+C-BA+C$-

For a given value A = 1, B = 2, C = 3. 8

c. Explain the applications of stacks. 4

2 a. Write an algorithm for converting infix expressions to prefix expression. Trace the algorithm indicating the content of stack for expressions,

$(A+(B-C)*D)\wedge E+F)$ 10

b. Obtain the prefix expressions and postfix expressions for the following :

i) $A+B-C*D$

ii) $(A+B)*(C+D)\$(A+B)$

iii) $((6+(2-3)*2\ \$\ 4\ \$\ 2)+8)$ 6

c. What is recursion? Write down the difference between recursion and iteration. 4

UNIT - II

3 a. What is advantage of representing a group of integers using linked list? Write a 'C' functions for performing the following:

i) To find the sum of all elements in a singly linked list

ii) To append a new element to the end of the linked list. 10

b. Write a program to implement doubly linked list using header mode. Develop algorithms for the following operations:

i) Insert at rear end

ii) Delete a node whose information field is specified

iii) Display the content of the list and also print the number of nodes in a list. 10

Contd… 2

4 a. Write a C function to reverse a given singly linked list without creating new nodes. 6

b. Write a C function to delete a mode from the front of the list and insert it at the end of the list. 6

c. Write a C function search (*p*, *x*) that adds an item *x* to the list pointed to by *p*, provided *x* is not in the list. Insertion can be done at the front end or rear end. 8

UNIT - III

5 a. Write a C program to add two long positive numbers, using linked list. 10

b. Write a program to evaluate a given polynomial. 10

6. a. What is a queue? Implement a circular queue in C. Mention the advantages of circular queue over ordinary queue. 10

b. Write down the applications of Queue. Write a C program to implement priority queue. 10

UNIT - IV

7 a. What do you mean by tree traversing? Mention the different types of tree traversal methods and Explain by taking a suitable example. 8

b. Write a program to create a binary search tree. 8

c. Define the following :

(i) Binary Tree (ii) Strictly binary tree 4

(iii) Almost complete binary tree (iv) Height of a tree.

8 a. Write an algorithm to create an expression tree and evaluation of post fix expression. 10

b. Explain threaded binary trees and its types. 6

c. Explain the applications of trees. 4

UNIT - V

9 a. Write a C program to implement Quick sort. Also show how the following elements get sorted using quick sort, 10

42, 37, 11 98, 36, 72, 65, 10, 88, 78

b. Write a program to sort the given set of numbers using Insertion sort. 10

10 a. Explain sentinel search and probability search with suitable example. 10

b. Explain ordered list search by considering appropriate example. 10

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