BMS College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

December 2017 Semester End Main Examinations

Course: Data Structures   **Duration: 3 hrs.**
Course Code: 15CS3DCDST   **Max Marks: 100**
                                                                  Date: 14.12.2017

Instructions: **Answer any FIVE full questions, choosing one from each Unit.**

UNIT 1

1.   a)   Define Stack, develop a C program to implement a stack using dynamic array   08
              whose initial capacity is 1 and array doubling is used to increase the stacks
              capacity whenever an element is added to a full stack. Implement the
              operations push, pop and display.

         b)   Convert the infix expression ((A+(B-C)*D)$E+F) to postfix expression. Write   08
              the algorithm to evaluate the postfix expression and also trace the same postfix
              expression for given values. A=6,B=3,C=2,D=5,E=1 F=7

         c)   Write an algorithm for tower of Hanoi. Demonstrate for 3 disks   04

UNIT 2

2.   a)   List and explain the functions supported by C for dynamic memory allocation   08
              with an example.

         b)   Write functions to perform the following: 08
              a.   Create a linked list contains 4 nodes with data 10,20,30,40
              b.   Assume the list contains 3 nodes with data 10, 20, 30, insert a node
                   with data 40 at end of list.
              c.   Insert a node with data 50 between the nodes having data values 10
                   and 20
              d.   Display the singly linked list

         c)   Explain doubly linked list with a pictorial representation. Discuss the   04
              advantages of doubly linked list over singly linked list

OR

3.   a)   Write a C program for demonstration of STACK using singly linked list   06
         b)   Write a C function to create an ordered list and to search for a key item in the   06
              singly linked list.
         c)   Write the node structure for linked representation of polynomial. Explain the   08
              algorithm to add two polynomials represented using linked list. give an
              example

UNIT 3

4. a) Define binary tree. State its properties. How it is represented using array and linked list? Give an example.　08

b) Show the binary tree with the arithmetic expression A/B*C*D+E. Give the algorithm for inorder, preorder postorder traversals and show the result of these traversals.　08

c) What is a binary search tree? Write an algorithm for recursive search or iterative search for a binary search tree.　04

UNIT 4

5. a) Discuss the advantages of threaded binary tree over binary tree and Explain types of threaded binary tree with example.　06

b) Define B-Tree. Discuss the insert and search operations on B-Tree with example.　08

c) List the properties of Red-Black tree. Justify insert operation is different from Binary search tree.　06

OR

6. a) Define AVL tree with an example. Briefly discuss the rotation operations are used to make a tree balanced　08

b) List the properties of 2-3 Tree and also give the structure of 2-3 trees. Write a recursive function to search a key in 2-3 Trees.　08

c) Explain the representational structure of Binomial Heaps.　04

UNIT 5

7. a) Write a C function for selection sort. Sort the following list using selection sort:45,20,40,5,15,25,50.　08

b) Define Hashing? Explain different methods of hashing functions.　06

c) Define Collision. Briefly discuss the various methods to resolve collision.　06

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