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BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

July / August 2017 Supplementary Semester Examinations

Course: **DATA STRUCTURES** Duration: **3 Hours**

Course Code: **09CI3GCDSL** Max Marks: **100**

Date: 29.07.2017

Instructions: **Answer FIVE FULL questions, choosing one from each unit.**

UNIT -1

1. a) Define data structure. How does a linear data structure differ from a non-linear data structure? Provide example for each. 05 Marks

   b) Write a C program that contains a structure definition for storing employee details, which includes the fields EmpNo, EmpName, and EmpAge. Declare an array of 100 employee records, read these records and arrange them in descending order of the EmpAge using any sorting technique. 07 Marks

   c) Write a C program to create a singly linked list with the following features: 08 Marks
   (i) to insert a node at the beginning of the list
   (ii) to delete all the occurrences of a given key element
   (iii) to display the contents of the list.

OR

2. a) Describe the concept of accessing array elements using pointers. 04 Marks

   b) Mention the advantages and disadvantages of storing linear data structures using linked lists, compared to storing them in an array. 04 Marks

   c) What are header nodes? Why are they required? Write the structure of a circular linked list without header node and with header node. 04 Marks

   d) With the help of following functions, write a C program to create a singly linked list with header node 08 Marks
   (i) insert a new node at the end of the list
   (ii) search for a given key element in the list
   At any point of time header node should contain total number of nodes in the list.

UNIT-2

3. a) Write C function 10 Marks
   i. That finds average of all the elements in a singly linked list of integers.
   ii. That concatenates two circular linked lists.

   b) Write C function to add two integer numbers using singly linked list. Each node in the list contains a single digit of the number. 10 Marks

OR

4. a) What are command line arguments ? Write C program to copy a given line of text into a file. Accept filename and text as command line arguments. 10 Marks

   b) Write a note on 10 Marks
   i. File opening and closing functions in C
   ii. Random access file functions in C

UNIT-3

5. a) Define stack. Using stack write a C program to determine if an input character string is of the form X@Y where X is a string consisting of letters 'A' and 'B' and Y is a string which is a reverse of X. Example if X="ABABBA" Y will be "ABBABA". At each point you may read only the next character of the string. 04 Marks

   b) Write an algorithm for converting a valid parenthesized infix expression to postfix form. Trace your algorithm on the following string 04 Marks
   ((A + B) * C - (D - E)) $ (F + G)

UNIT-4

6. a) What are the disadvantages of linear queue over circular queue. Write a program to implement a circular queue. 08 Marks

   b) Define Deque.Write a program to implement input restricted Deque 08 Marks

   c) Give any 4 applications of queue. 04 Marks

UNIT-5

7. a) Write Recursive C functions for each of the following: 04 Marks
   i) Find the maximum element in a Binary Search Tree.
   ii) Count the number of nodes in a Binary tree.

   b) Write C function to create a Binary Search Tree with non-repeated elements. Construct the Binary Search Tree for the following sequence: 50, 20, 8, 79, 15, 18, 16, 83, 21, 65, 40. Also, give the Preorder, Inorder and Postorder traversals for the constructed tree. 08 Marks

   c) What are threaded binary trees? Discuss different types of threaded binary trees with an example for each. 08 Marks

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