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**B.M.S. College of Engineering, Bengaluru-560019**

**Autonomous Institute Affiliated to VTU**

**July / August 2019 Supplementary Examinations**

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| **Programme: B.E.** | **Semester : III** |
| **Branch : INFORMATION SCIENCE AND ENGINEERING** | **Duration: 3 hrs.** |
| **Course Code: 15IS3DCDSC** | **Max Marks: 100** |
| **Course Title: DATA STRUCTURES WITH C** | **Date: 29.07.2019** |

**Instructions**: 1. Answer any FIVE full questions, choosing one full question from each unit.

2. Missing data, if any may suitably assumed.

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| **Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice. |  |  | **UNIT - I** |  |
| 1 | a) | Define nested structures in C. A set of integers is stored as a data member in a structure called “numbers”. The same structure also contains a nested structure called “processed\_numbers”. The task to be performed is that to segregate the integers into odd & even numbers and store them in the arrays odd\_nos and even\_nos which are the data members of the structure “processed\_numbers”. Develop a C program to implement the same. | **08** |
|  | b) | With general syntax, explain the use of malloc() function in C. Define a structure HOTEL with following fields: hotel name, grade, average room charge. Using this structure, develop a C program to allocate memory space dynamically for *n* hotels, read the details of *n* hotels and list all the hotels of a specified grade in the increasing order of their room charges. | **12** |
|  |  | **UNIT - II** |  |
| 2 | a) | Develop C functions to perform insertion and deletion operations on Stack of integers using dynamic arrays. | **08** |
|  | b) | Develop an algorithm to evaluate a valid postfix expression made up of single digit operands using the Stack data structure. Also, trace the same for the postfix expression, 62+3\*42$- | **08** |
|  | c) | Develop a recursive C function to search for a character in a given string using Linear Search technique. | **04** |
|  |  | **UNIT - III** |  |
| 3 | a) | Develop C functions to perform insertion, deletion and display operations on a Circular Queue of characters using dynamic arrays. | **12** |
|  | b) | Consider a Singly Linked List consisting of employee name, id and salary information in each node. Develop C functions to perform the following operations on the list:   1. Search for a node based on the id and update the salary by Rs. 2000. 2. Display the information of only those employees with specified salary. | **08** |
|  |  | **OR** |  |
| 4 | a) | A list of names is to be stored in a Singly Linked List in such a way that the name inserted first is to be deleted last. Develop C functions to perform insertion, deletion and display operations for such a list. | **12** |
|  | b) | Given a polynomial of the form a0 + a1x + a2 x2 + . . . + a*n*x*n*, develop C functions to perform the following operations:   1. Construct a Singly Linked List to represent the polynomial. 2. Evaluate the polynomial represented using the Singly Linked List. | **08** |
|  |  | **UNIT - IV** |  |
| 5 | a) | Develop C functions to perform the following operations on a Circular Singly Linked List:   1. Replace all occurrences of integer X in the information field of the nodes with the integer Y in the list. 2. Insert a node to the right of the key element. | **08** |
|  | b) | Consider a Doubly Linked list representing a string of characters. Develop a C function to check whether the string is a palindrome or not. Display the results with suitable messages. | **05** |
|  | c) | Define Binary tree. Traverse the following tree in Inorder, Preorder and Postorder: | **07** |
|  |  | **UNIT - V** |  |
| 6 | a) | Develop C functions for the following in a Binary Search Tree:   1. Find the maximum element. 2. Find the sum of integer information stored in each node. 3. Search for the specified key element. | **12** |
|  | b) | What are Threaded Binary Trees? Briefly explain the different types of Threaded Binary Trees in C. | **08** |
|  |  | **OR** |  |
| 7 | a) | Define Binary Search Tree. Develop a C function to construct a Binary Search Tree with non-repeated elements. Construct the Binary Search Tree for the following sequence of elements entered as a sequential set:  10, 20, 8, 9, 15, 18, 16, 13, 21.  Also, give the linked list representation of the in-threaded binary tree for the constructed Binary Search Tree. | **12** |
|  | b) | Develop C functions for the following:   1. Count the number of leaf nodes in a Binary Tree. 2. Find the level of a node in a Binary Search Tree. | **08** |

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