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# BMS College of Engineering, Bengaluru-560019

**Autonomous Institute Affiliated to VTU**

## January 2018 Semester End Make Up Examinations

**Course: Data Structures with C** **Duration: 3 hrs.**
**Course Code: 15IS3DCDSC** **Max Marks: 100**
**Date:13.01.2018**

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

### UNIT 1

**1.** a) Describe the four built-in dynamic memory allocation functions with an example for each. **06**

b) Design an efficient way to implement a sparse matrix using arrays. **04**

c) Implement a C routine to add two polynomials implemented using arrays. **10**

### UNIT 2

**2.** a) Convert the following infix expressions to prefix and postfix equivalents: **06**

i) A/B *C*D+E ii) (X-Y)*Z+(L+(M+N) /O*P)

b) Write a C program for converting a fully parenthesized valid infix expression to its equivalent postfix expression. **10**

c) Write a C Program to Print the Alternate Nodes in a Linked List using Recursion **04**

### UNIT 3

**3.** a) Develop a C program for the implementation of a circular queue using arrays. **10**

b) Implement the following operations on a singly linked list **10**

i) Reverse the list

ii) Identify the node with the minimum value

iii) Delete the first node

### OR

**4.** a) What are the advantages and disadvantages of representing a group of items as an array versus a linked list? **06**

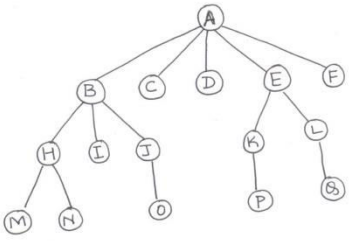
b) Write a C program to implement a queue using linked list. Ensure to perform the following operations on the queue: i) Insert ii)Delete iii)Display **09**

c) Two Queue data structures namely Q1 and Q2 that support standard operations like insert() and delete() are given. Implement a Stack data structure using these Queues. **05**

## UNIT 4

**5.** a) An ordered Doubly Linked List (DLL) whose first node is denoted by 'start' and node is represented by 'key' as information is to be constructed. Write a C program to construct the DLL and to also implement deleting number of nodes whose 'key' values are greater than or equal to 'kmin ' and less than 'kmax '. **10**

b) Convert the following tree into Left Child- Right Sibling representation. **06**




c) Prove that the maximum number of nodes in a binary tree of depth $k$ is $2^{k+1}$ -1. **04**

## UNIT 5

**6.** a) Implement a C routine to delete the element with key $K$ from a Binary Search Tree. **08**

b) How are trees used to represent disjoint sets? Comment on the Union and Find operations. **07**

c) Build the binary tree from the following tree traversals: **05**

Postorder : DEBFGHCA

Inorder : DBEAFGCH

**OR**

**7.** a) Develop a C routine to determine the equivalence of two given binary trees. **06**

b) Construct a binary search tree for the following list of elements and traverse this tree using inorder and preorder traversal method. **08**

90,40,10,120, 30,180,25,60,65,190,110

c) Draw winner tree and loser tree for 8 player scores. Assume appropriate unique scores. **06**

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