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# BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

## January 2017 Semester End Make Up Examinations

Course: **Data Structures With C**  
Course Code: **15IS3DCDSC**

Duration: **3 hrs**  
Max Marks: **100**  
Date: 16.01.2017

**Instructions: 1. Answer any five full questions choosing one from each unit.**  
**2. Assume missing data (if any) suitably**

### UNIT 1

1. a) Implement a C program to maintain a record of “n” student details using an array of structures with four fields (Roll number, Name, Marks, and Grade). Each field to be of an appropriate data type. Print the marks of the student given student name as input **10**
- b) Define a sparse matrix? Explain a space efficient way of storing a sparse matrix using arrays. **04**
- c) Explain the different types of dynamic memory allocations in C **06**

### UNIT 2

2. a) Design an algorithm to convert an expression from infix to postfix. **05**
- b) Implement a recursive function fact(n) to find the factorial of an integer. **05**
- c) Implement the Push() , Pop() and Display() functions of a STACK in C realized using arrays. **10**

### UNIT 3

3. a) Consider a linked list to store a polynomial, that is, every node of the linked list has coefficient, exponent and pointer to the next node in the list. **10**
  - (i) Define a structure for node of such a list.
  - (ii) Write a function to add two such polynomials.The function should accept pointers to the two polynomials as arguments and return the pointer to the resultant polynomial. Assume that the polynomials passed to the function are in decreasing order on the exponents.
- b) Develop a C Program to perform the following operations on a linear queue implemented using linked list. **10**
  - (i) Insert
  - (ii) Delete
  - (iii) Display

### OR

4. a) Develop a C Program to insert an element at the beginning of a singly linked list. After inserting the element, display all the elements. Check for ‘List empty’ before insertion. Also delete an element from the rear end of the list. **10**
- b) Distinguish between Linked lists and Arrays. Mention their relative advantages and disadvantages. **04**

- c) Develop a C program to perform the following operations on the circular queue using arrays:  
 (i) Insertion (ii) Display 06

#### UNIT 4

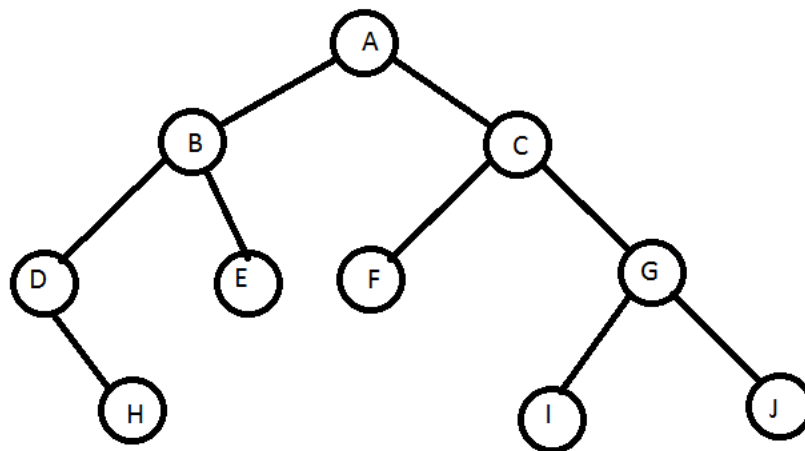
5. a) Develop a C program to perform the following operations on doubly linked list:  
 i) Insert a node at the beginning  
 ii) Delete K<sup>th</sup> node.  
 iii) Display alternate nodes 10
- b) Implement a C routine to reverse a singly linked list so that the last element becomes the first and vice versa. 05
- c) Write C functions for inorder and postorder traversals in a binary tree. 05

#### UNIT 5

6. a) Implement C functions to:  
 (i) To count the number of nodes of a binary tree  
 (ii) To find the maximum value in a binary search tree. 06
- b) Write a C program to insert an item into a binary search tree. While inserting, take care of duplicate items. 10
- c) Explain Threaded binary tree with an example. 04

**OR**

7. a) Traverse the given tree using Inorder, Preorder and Postorder traversals. 03



- b) Explain the following with an example : 07  
 (i) Selection tree  
 (ii) Representation of Disjoint sets
- c) Develop a C program to search and delete an item in BST. 10

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