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BMS College of Engineering, Bangalore-560019

(Autonomous Institute, Affiliated to VTU, Belgaum)

December 2016 Semester End Main Examinations

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

Duration: **3 hrs**
Max Marks: **100**
Date: 20.12.2016

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

UNIT 1

1. a) What is a structure? Give three different ways of defining structure & declaring variables & method of accessing members of structures using student structure with roll number, names & marks in 3 subjects as members of that structure as example. **10**
- b) What is degree of polynomial? Consider two polynomials $A(x)=x^{1000}+1$ and $B(x)=10x^3+3x^2+1$. Show diagrammatically how two polynomials can be represented in an array. **05**
- c) With suitable example, explain dynamic memory allocation for 2-D arrays. **05**

UNIT 2

2. a) What is System stack? Give the Abstract Data type specifications of stack implementing various operations. **05**
- b) Outline an algorithm to convert a valid infix expression to a postfix expression. Also evaluate the suffix expression $AB+C-BA+C\$$ for the values: $A=1$ $B=2$ $C=3$. **10**
- c) What are the different ways of defining recursion? Give two conditions to be followed for successful working of recursive program. **05**

UNIT 3

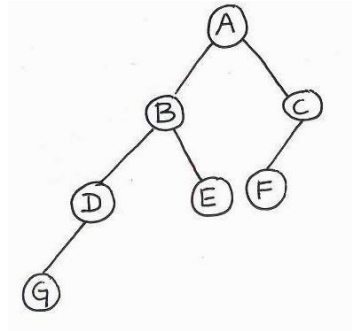
3. a) What is the advantage of circular queue over ordinary queue? Mention any 2 applications of queues. **05**
- b) What is a linked list? Explain the different types of linked list with diagram. Write C program to implement the insert and delete operation on a stack using linked list. **10**
- c) Explain the algorithm to add two polynomials represented using linked lists. **05**

OR

4. a) Develop a C program to demonstrate the operations of a queue implemented using circular linked list. **10**
- b) Implement the following functions for singly linked list: **06**
 - i) Reverse the list
 - ii) Concatenate two lists
- c) Compare the pros and cons of implementing singly linked list and doubly linked list. **04**

UNIT 4

5. a) Implement a C function to insert a node at front and rear end in a circular linked list. **05**
b) Write a C program to perform the following operations on doubly linked list : **10**
 i) insert before Kth node
 ii) delete the middle node.
c) Define binary trees. For the given tree find the following : **05**
 i. leaf nodes ii. Non- leaf nodes iii. Ancestors of G iv. levels of tree



UNIT 5

6. a) Construct a Binary search tree with atleast 6 nodes. Write an iterative function to search for a key value in a binary search tree **06**
b) What is a threaded binary tree? Explain right in and left in threaded binary trees. Write a function to traverse a threaded binary tree in inorder. **10**
c) What is a winner tree? Explain with suitable example a winner tree for k= 8. **04**

OR

7. a) Construct a Binary Search Tree for the input – ‘Q’, ‘U’, ‘I’, ‘C’, ‘K’, ‘S’, ‘O’, ‘R’, ‘T’. **06**
b) Write recursive C routines to perform the following operations on a BST- **07**
 (i) Insert a value
 (ii) Display the maximum value in the tree
c) What is a forest? With suitable example illustrate how you would transform a forest into a binary tree. **07**
