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BMS College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

December 2017 Semester End Main Examinations

Course: Data Structures with C
Course Code: 15IS3DCDSC

Duration: 3 hrs.
Max Marks: 100
Date: 19.12.2017

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

UNIT 1

1. a) What is structure? Give different ways of defining structure and declaring variables and method of accessing members of structures using a student structure with roll number, name, and marks of subjects as members of that structure as example. **08**
- b) Write an algorithm for transpose the given sparse matrix. Consider a matrix of size 5 X 6 containing 6 number of non-zero values as triplets and find its transpose. **06**

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 9 & 0 \\ 0 & 8 & 0 & 0 & 0 & 0 \\ 4 & 0 & 0 & 2 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 5 \\ 0 & 0 & 2 & 0 & 0 & 0 \end{bmatrix}$$

- c) Give the differences between: **06**
 - i) Static memory allocation and dynamic memory allocation
 - ii) Malloc() and calloc().

UNIT 2

2. a) Create a function of Linked Stack using dynamic arrays and show the operations of push, pop and display elements. **08**
- b) Write an algorithm to convert a valid infix expression to a postfix expression. Also evaluate the following suffix expression for the values: A=1 B=2 C=3. 1) AB+C-BA+C\$- **08**
- c) Give the Ackerman's Function. Write a function demonstrate Ackerman's Function. **04**

UNIT 3

3. a) What is Circular Queue? List its operations. Develop a C program for the implementation of a circular queue using arrays. **08**
- b) For a given sparse matrix, write the diagrammatic linked representation. **04**

$$\begin{bmatrix} 0 & 0 & 0 & 9 & 0 \\ 0 & 8 & 0 & 0 & 0 \\ 4 & 0 & 0 & 2 & 0 \\ 0 & 0 & 0 & 0 & 5 \\ 0 & 0 & 2 & 0 & 0 \end{bmatrix}$$

- c) Develop the C function for Adding and evaluating Polynomials using Circular Linked List. **08**

OR

4. a) Write a C program to implement a queue using linked list. Ensure to perform the following operations on the queue: **10**
- i) insert ii) delete iii) display
- b) i) Write a C function to reverse the given singly linked list. **10**
- ii) Write a C function to concatenate two singly linked list.

UNIT 4

5. a) Define the tree and suitable example define the following i) Binary tree ii) Complete binary tree iii) Degree of a binary tree iv) Depth of binary tree **08**
- b) Write a function to implement the following operations on doubly linked list: **08**
- (i) Insert an element at the beginning
- (ii) Deleting all nodes whose information field is even number
- c) Construct a binary tree from a given preorder and inorder sequence: **04**
- i) Preorder: A B D G C E H I F ii) Inorder: B CAEDGHFI

UNIT 5

6. a) What is threaded binary tree? Write a function to traverse a threaded binary tree in preorder **08**
- b) What is a forest? With suitable example illustrate how you transform a forest into a binary tree. **06**
- c) Explain with suitable example, how traversing a tree using selection trees. **06**

OR

7. a) What is a winner tree? Explain with suitable example a winner tree for k= 8. **06**
- b) Describe the binary search tree with an example. Write a iterative & recursive **08**

function to search for a key value in a binary search tree.

- c) Define disjoint sets? Consider the three disjoint sets $S1=\{0,6,7,8\}$ $S2=\{1,4,9\}$ $S3=\{2,3,5\}$. **06**

Represents the following in:

- i) tree(linked list representation) ii) Array representation
