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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
Course Code: 15CS3DCDST

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

Date: 15.12.2016

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

UNIT 1

- 1 a) Discuss how structure differs from an array. Explain nested structure with an example. **04**
- b) Write a C program to evaluate a given valid postfix expression. Trace the same for the postfix expression $AB+CD+AB+*$, where $A=1$, $B=2$, $C=3$, and $D=1$ ('\$' represents exponentiation) **08**
- c) Define priority queue. Write a C program to implement priority queue using arrays with three priority levels. **08**

UNIT 2

- 2 a) List merits and demerits of linked lists over arrays. **04**
- b) Using singly linked list, write C function **08**
 - (i) To create two ordered (ascending) lists and
 - (ii) To merge these lists into a third list
- c) Write a C program to perform following operations on a doubly linked list: **08**
 - (i) Insert a node after a node whose information is given
 - (ii) Delete last node from the list
 - (iii) Count the number of nodes in the list
 - (iv) Display the content of the list in reverse order

OR

- 3 a) Discuss the implementation of stack operations using linked lists. Write a C program to implement stack of integers using singly linked list. **08**
- b) Write a C program to add two long integers using circular linked lists with header node. **08**
- c) Write a C function to reverse the contents of singly linked list without creating an extra node. **04**

UNIT 3

- 4 a) Define the following terms with an example: **06**
 - (i) Strictly binary tree
 - (ii) Almost complete binary tree
 - (iii) left descendant in a Binary tree
- b) Write a C program to construct a binary tree. **08**
- c) Construct a binary tree for the following preorder and inorder traversals: **06**

Preorder: A B D G C J M E H I F K L
Inorder: D G B J C A H E I M K F L

UNIT 4

- 5 a) Define Threaded binary trees. Discuss different types of Threaded binary tree with an example for each. **08**
 b) Illustrate RL and LR rotations of AVL tree with an example for each. Construct an AVL tree for the following data: 1, 8, 6, 5, 3, 7, 4 **08**
 c) Write an algorithm to search a key k in a B-tree. **04**

OR

- 6 a) Discuss the representation of a Binomial heap. Explain with an example. **06**
 b) Show the results of inserting the keys H, K, F, S, Q, C, L, P, A, X, Z, Y, E, M, R in order into an empty B-tree with minimum degree 2. Only draw the configurations of the tree just before node split, and also draw the final configuration. **10**
 c) Explain when you call a Binary search tree as a Red-Black tree. Write the properties. **04**

UNIT 5

- 7 a) Explain Radix sort technique. Sort the following set of elements using Radix sort: 247, 785, 368, 179, 806, 686, 198, 94. **08**
 b) Apply the comparison counting sorting technique to sort the list 62, 31, 84, 96, 19, 47 in ascending order. **06**
 c) Describe how double hashing technique resolves hash collisions. **06**
