

# BMS College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

## January 2018 Semester End Make Up Examinations

Course: Data Structures  
Course Code: 15CS3DCDST

Duration: 3 hrs.  
Max Marks: 100  
Date: 09.01.2018

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

### UNIT 1

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|----|----|---|----|
| 1. | a) | Develop an algorithm to convert an infix expression to a postfix expression using stack   | 08 |
|    | b) | Convert the given infix expression to postfix expression $A + (B * C - D) / E + F * G / H$ . Also show the stack contents for the same in each step | 05 |
|    | c) | Discuss the advantages of using circular queue over linear queue. Write an algorithm for insert and delete operations on circular queue             | 07 |

### UNIT 2

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|----|----|---|----|
| 2. | a) | Write a program to add two polynomials when the polynomials are represented using singly linked lists | 10 |
|    | b) | Develop a program to implement doubly linked list with support for the following operations           | 10 |
|    |    | i. Create a doubly linked list.   |    |
|    |    | ii. Delete the node in the list given the node's data   |    |

### OR

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|----|----|---|----|
| 3. | a) | Develop a function to reverse the contents of a singly linked list without creating another linked list | 08 |
|    | b) | Write a C program to implement queue using a singly linked list   | 08 |
|    | c) | Explain the advantages of linked lists over arrays  | 04 |

### UNIT 3

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|----|----|--|----|
| 4. | a) | Demonstrate the various cases during deletion of an element in a binary search tree  | 06 |
|    | b) | Create a Binary Search Tree (BST) for the following sequence of numbers 50, 25, 75, 22, 40, 60, 80, 90, 15, 30. Write recursive algorithm/program to implement in-order and pre-order traversal of the BST | 10 |
|    | c) | Construct a Binary Tree for the following data:<br>Preorder: 8, 5, 9, 7, 1, 12, 2, 4, 11, 3,<br>Inorder: 9, 5, 1, 7, 2, 12, 8, 4, 3, 11  | 04 |

#### UNIT 4

5. a) Construct Huffman tree for the file with alphabets and their frequency as follows: {(A, 100), (B, 60), (C, 70), (D, 43), (E, 24), (F, 59)} 06
- b) Explain the representational structure of Binomial and Fibonacci heap 04
- c) Define height balanced tree with its advantages. Explain LL, RR, LR and RL rotations in AVL search tree with examples. Construct an AVL tree by inserting the following elements in the order of their occurrence 64, 1, 44, 26, 13, 110, 98, 85, 52, 120 10

#### OR

6. a) Show the result of inserting the values 2, 1,4,5,9,3,6,7 into an empty splay tree. Show the tree at the end of each insertion. Show each rotation 07
- b) Write the advantages of threaded binary tree over simple binary tree with an example 05
- c) Use the following sequence to construct a 2-3 tree: 2, 3, 5, 6, 9, 8, 7, 4, 1. Explain the insertion procedure of a node in the 2-3 Tree. 08

#### UNIT 5

7. a) Explain Insertion sort algorithm. Show step by step procedure to sort the following queue of objects whose keys are 23,78,45,8,32,56 10
- b) Define Hashing. How do collisions happen during hashing? Explain different techniques of resolving collision 10

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