

(Please write your Exam Roll No.)

Exam Roll No

**Bharti Vidyapeeth's
Institute of Computer Applications and Management
A-4, Paschim Vihar, New Delhi-63**

SECOND SEMESTER [MCA] Internal Examination, February 2019

Paper Code: MCA - 102

Subject: Data and File Structures

Time: 2 Hours

Maximum Marks: 45

Note: Attempt THREE questions in all. Question No. 1 is compulsory and attempt one question from each unit.

1. Answer all the following questions briefly: - 1.5 x 10 = 15
- (a) Define data structure. Describe about its need and types.
 - (b) Estimate the maximum height of any AVL-tree with 7 nodes? Assume that the height of a tree with a single node is 0.
 - (c) Evaluate the postfix expression: 4 5 6 * + step by step using stack.
 - (d) Construct stack full condition when a double stack is implemented within a single array DS[Max].
 - (e) Design a function in "C" for finding the node having maximum value in a BST.
 - (f) Determine the minimum and maximum heights of a binary tree with 7 nodes?
 - (g) Examine the complexity in Big Oh (O) notation
 - (i) for (i= n; i> 0; i/=2)
application code
 - (ii) for (i= n; i> 0; i+=2)
application code
 - (h) Design a max heap, stepwise, by inserting the following values: 3, 1, 6, 5, 2, 4.
 - (i) Assume we want to convert a binary tree into its mirror image, in which order (inorder, preorder, postorder) should we traverse it?
 - (j) Estimate the worst-case time and space complexity of in-order traversal of simple BST and threaded BST?

UNIT – I

2. (a) Discuss the time complexity and space complexity of an algorithm? Prove that the worst-case time complexity of a linear search algorithm is O(n). 5
- (b) Design a function in "C" to insert a node at (a) beginning of the linked list, (b) specific position of the linked list, and (c) the end of a linear linked list. 5
- (c) Develop a function in "C" to perform check palindrome using appropriate data structure. 5
3. (a) Design a function "C" to perform insertion and deletion of an element in double stack. While inserting/deleting an element, the choice of stack (stack 1 or stack 2) should be given. 5
- (b) Assume, you are given two linear linked lists, **L1: 5, 8, 6, 11** and **L2: 4, 3, 7, -5**. Construct necessary function(s) in "C" to perform addition of two linked lists and store the result in a third linked list. 5
- (c) Create the postorder traversal sequence of the binary search tree whose preorder traversal sequence is 30, 20, 10, 15, 25, 23, 39, 35, 42. 5

UNIT – II

4. (a) Construct an AVL tree by inserting the following values: 3, 5, 11, 8, 4, 1, 12, 7, 2, 6, 10. 5
- (b) Discuss B-Tree? Describe the properties of B-Tree. List out the advantages of B-Tree over Binary Search Tree (BST)? 5
- (c) Design a function in “C” programming to check whether two BSTs are identical or not. 5
5. (a) Construct a function in “C” to store the union of two sorted linear lined list into third list. 5
- (b) What is B+ Tree? Compare and contrast B Tree and B+ Tree. 5
- (c) Develop a function to list out the nodes of a binary tree in level-order. List the root, then nodes at depth 1, followed by nodes at depth 2, and so on. You must do it in linear time. 5
