Seat No:_____ **Enrollment No:_____**

PARUL UNIVERSITY

FACULTY OF IT & COMPUTER SCIENCE

BCA / IMCA Summer 2017-18 Examination

Semester: 2 **Date: 19-05-2018**
Subject Code: 05101152 / 05301152 **Time: 10:30AM to 01:00PM**
Subject Name: Data Structures **Total Marks: 60**

Instructions:
1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

Q.1 Answer the followings.

A. Write short notes. **(05)**

1. Write any 3 applications of DS.
2. Define Recursion.
3. List any 2 types of Tree Traversal Methods.
4. List any 2 dynamic memory allocation functions used in C Programming Language.
5. Define Non-Primitive DS.

B. Multiple choice type questions/ Give the sentence true or false. (Each of 01 marks) **(10)**

1. Assuming int is of 4bytes, what is the size of int arr[15];?
   a) 15 b) 19 c) 11 d) 60
2. In a stack, if a user tries to remove an element from empty stack it is called _____
   a) Underflow b) Empty collection c) Overflow d) Garbage Collection
3. The prefix form of an infix expression p + q – r * t is?
   a) + pq – *rt b) – +pqr * t c) – +pq * rt d) – + * pqrt
4. A data structure in which elements can be inserted or deleted at/from both the ends but not in the middle is?
   a) Queue b) Circular queue c) Dequeue d) Priority queue
5. Which of the following is not the type of queue?
   a) Ordinary queue b) Single ended queue c) Circular queue d) Priority queue
6. Linked list is considered as an example of _____ type of memory allocation.
   a) Dynamic b) Static c) Compile time d) None of the mentioned
7. You are given pointers to first and last nodes of a singly linked list, which of the following operations are dependent on the length of the linked list?
   a) Delete the first element b) Insert a new element as a first element
   c) Delete the last element of the list d) Add a new element at the end of the list
8. When do you use a sparse array?
   a) When there are unique elements in the array
   b) When the array has more occurrence of zero elements
   c) When the data type of elements differ
   d) In all of the mentioned cases
9. Given an array arr = {5,6,77,88,99} and key = 88; How many iterations are done until the element is found (Binary Search)?
   a) 1 b) 3 c) 4 d) 2
10. 10. The data structure required to check whether an expression contains balanced parenthesis is?
    a) Stack b) Queue c) Array d) Tree

Q.2 Answer the followings. (Attempt any 05) **(15)**

1. Define Data Structure and explain types of possible operations of DS.
2. Construct lexically ordered tree for the following nodes 65,10,34,65,37,23,4,22,11,43,56
3. Find the location of A [1, 3] in given two dimensional row major array A where 0<=i<=3, 0<=j<=4 and l0=750. Note: each element requires 2 bytes to store in memory
4. Discuss Sparse Matrix with suitable example.
5. Write short note on Recursive Function.
6. Convert given infix into postfix and prefix expression (A+B)*C-(D-E)*(F+G)

Q.3 Answer the following. (Any three) **(15)**

1. What is sorting? List any 3 Sorting techniques and Discuss Quick Sorting with suitable example.
2. How the concept of Balance Factor is used in AVL Tree? Check which of the following tree is AVL Tree? Why?

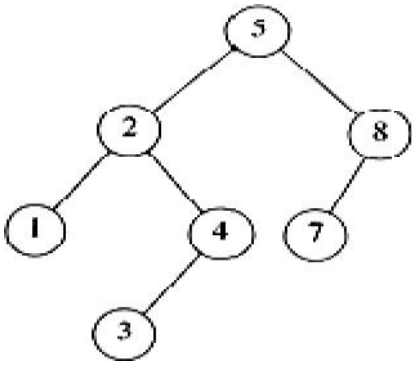

Figure-A

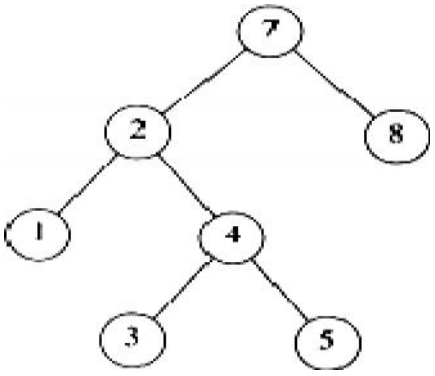

Figure-B

3. What are the time complexities for Linear and Binary Search?
4. Discuss Threaded binary tree.

Q.4 Answer the following.

A. Discuss Indexed File Organization in detail. **(05)**

B. Define Stack. List different types of Stack Operations and write algorithm of any 2 Stack Operations. **(10)**

OR

B. Differentiate Static and Dynamic Memory Allocation. Write an algorithm for insertion of new element at the end of the Linked List. **(10)**