

**YMCA UNIVERSITY OF SCIENCE & TECHNOLOGY, FARIDABAD****MCA EXAMINATION MAY 2018****DATA STRUCTURES (MCA-201)**

Time: 3 Hours

Max. Marks: 60

- Note: 1. It is compulsory to answer the questions of Part -1.  
 2. Answer any four questions from Part -2 in detail.  
 3. Different parts of the same question are to be attempted adjacent to each other.

**PART -1**

- Q1 (a) What do you mean by space and time complexity of a program? (2)  
 (b) Write a program to insert an element at a desired position in to a given array. (2)  
 (c) What are the overflow and underflow conditions of a circular queue? (2)  
 (d) Define non linear data structures. (2)  
 (e) What is hashing? (2)  
 (f) What is a sparse matrix? Describe the advantages of representing a matrix by sparse representation? (2)  
 (g) What is adjacency matrix? (2)  
 (h) Write applications of circular linked list. (2)  
 (i) Define Sets? Explain the operation which can be defined on sets. (2)  
 (j) How can the end of a file be detected? Explain. (2)

**PART -2**

- Q2 (a) What is a stack? Write a program to implement a STACK using linear linked list? (5)  
 (b) What is searching? Write a program to search an element from a given array using binary search. (5)
- Q3 Write a program to create a general binary tree using a suitable intermediate representation and show its traversal. (10)
- Q4 (a) What is a doubly ended Queue? Write a program/ algorithm to implement a doubly ended Queue (Deque). (5)  
 (b) Write merge sort algorithm and derive its best, worst and average time complexities. (5)
- Q5 Write an algorithm to convert an infix expression in to a postfix expression. Write an algorithm to translate the infix expression to its equivalent postfix expression and apply the same on following expression: (10)  
 $(p-q+r)/s^{(t-u)}*v$
- Q6 Define Graph. How it can be represented in memory? Consider the suitable graph of your choice and traverse it using Breadth First Traversal and Depth First Traversal techniques (10)
- Q7 Write short notes on **any two** of the following: (10)
- Bucket sort
  - Skip Lists
  - B Tree

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