II Semester M.C.A. Examination, July 2017
(CBCS)
COMPUTER SCIENCE
MCA – 201T: Data Structures

Time: 3 Hours  Max. Marks: 70

Instructions: 1) Part – A: Answer any five questions. (5×6=30)
   2) Part – B: Answer any four questions. (4×10=40)

PART – A

A. Answer any five. Each question carries six marks. (6×5=30)

1) a) Why do we need data structures? Mention data structure classification.
   b) What is the best time and worst time complexity of linear search?

2) Insert {7, 3, 2, 4, 6, 0} into a linear queue of size 4.

3) Differentiate between Depth First Search (DFS) and Breadth First Search (BFS) with an example.

4) What is polish expression? Convert the following infix expression into postfix expression:
   \[ f^*(g + (a + b/c))*e + d \]

5) Write a code for concatenating two strings without using inbuilt function.

6) Write an algorithm for selection sort with its time complexity.

7) What are applications of the following data structures?
   a) Stack
   b) Linked list.

8) a) What is typedef and why do we use?
   b) Write a recursive algorithm to solve tower of Hanoi with 3 discs.
PART - B

B. Answer any four. Each question carries ten marks. \( (4 \times 10 = 40) \)

9) a) Brief on the concept of time and space complexity.
   b) Write a program to convert infix to postfix expression.

10) a) Why is binary search better than linear search? Explain binary search technique with the help of an algorithm.
   b) What is abstract data type?

11) Explain stack and queue operation in detail. Write algorithms for the same.

12) Explain the concept of singly linked list by creating node, inserting node and displaying nodes with the help of programming.

13) With necessary algorithm, sort the following using merge sort:
    \{42, 23, 74, 11, 65, 57, 94, 36, 99, 87, 70\}

14) Write short notes on:
   a) Binary search tree insertion and deletion operation.
   b) Define: Binary tree, complete graph and directed graph.
II Semester M.C.A. Examination, June 2016  
(CBCS)  
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MCA – 201 T : Data Structures  

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PART – A  

Answer any five questions.  

(5×6=30)  

1. What are Asymptotic notations ? Explain.  
2. Define data structure and explain various operations on data structures.  
3. Explain with an algorithm traversal of linear arrays.  
5. Explain the insertion and deletion operations in a Singly linked list.  
6. Convert the given infix expression into its postfix form : A/(B*C) + D * E - A ^ C.  
7. Write a recursive function to calculate Fibonacci series.  
8. Give the algorithm for DFS.  

PART – B  

Answer any four questions.  

(4×10=40)  

9. a) Explain Boyer-Moore string pattern matching algorithm.  
   b) What are Abstract data types ?  
10. a) Explain Binary search technique with the algorithm.  
    b) Explain sparse matrices.  

P.T.O.
11. Explain types of Linked lists with examples.  

12. a) Differentiate between circular queue and double ended queue.  
    b) Explain push and pop operations on stack.  

13. With relevant functions explain tree traversal techniques.  

14. Write short notes on:  
    a) Heap Sort.  
    b) Applications of Stacks.
II Semester M.C.A. Examination, June 2015
(CBCS)
MCA – 201T : DATA STRUCTURES

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PART – A

Answer any five questions : (5x6=30)

1. What is recursion ? What are the various types of recursion ? Explain with an example.

2. What do you mean by asymptotic behaviour of a function ? What are the different types of asymptotic notations ?

3. Write an algorithm to sort ‘n’ numbers using selection sort.

4. What is a sparse matrix ? Design an algorithm to search an item in sparse matrix.

5. What is ADT Stack ? Write an algorithm to convert expression from infix notation to postfix notation.

6. What is a weighted graph ? Write the adjacency matrix for the following graph :

   ![Graph Diagram]

7. What is a priority queue ? Explain operations and applications of queues.

8. What is a binary search tree ? What are the different types of binary search trees ? Explain.
PART - B

Answer any four questions:

(4x10=40)

9. a) Write an algorithm to illustrate Bubble Sort. Write the time complexity.
   b) Write a recursive program to find the factorial of ‘n’.

10. a) Illustrate the concept of circular queue.
     b) Obtain the prefix expression for \((a + (b - c) \times d) \times e + f)\).

11. a) List out differences between singly linked list and doubly linked list.
     b) Write an algorithm to concatenate two lists into a single list.

12. a) What is tree traversing? What is pre-order traversing for the following tree:

   ![Tree Diagram]

   b) Given a doubly linked list with elements \(\{5, 6, 9, 10, 12\}\) 5 being the first element, and 12 being the last element, write an algorithm to insert element in the doubly linked list and show the proof for inserting an element between 6 and 9.

13. a) Sort \(\{6, 9, 4, 3, 7, 5\}\) using minimum heap, heap sort algorithm.
     b) Write a function to insert an item into a binary search tree.

14. Write short notes on:
   i) Warshall’s Algorithm
   ii) Row major representation of a matrix.