

MCA
(SEM II) THEORY EXAMINATION 2017-18
DATA STRUCTURES

Time: 3 Hours

Total Marks: 70

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14
- What are the data structures used to perform recursion?
 - State the difference between stacks and linked lists?
 - Translate the following infix expression into its equivalent postfix expression by showing all steps $(A-B)/((D+E)*F)$
 - Define the terms binary tree, complete binary tree and threaded binary tree?
 - What is a heap? How does heap sort work?
 - Write Short Note on Indexing and Hashing in file structures?
 - Write a program for insertion sorting. Analyze its running time ?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21
- Write an algorithm to convert in the infix expression to postfix Expression?
 - Write a program of binary search. Analyze its running time. ?
 - Write a C program to perform Merge sort and analyze time complexity of the algorithm?
 - Is it possible to implement a queue with the help of two Stacks? Explain.
 - Define a B tree. Construct a B tree of order 3 by inserting following keys in the order shown into an empty B tree.
M Q A N P W X T G E J

SECTION C

3. Attempt any *one* part of the following: 7 x 1 = 7
- Define Sparse Matrices? How Sparse Matrices can be represented?
 - Explain recursion. Write a recursive algorithm to calculate the factorial of a number. Also calculate the time complexity of this routine.
4. Attempt any *one* part of the following: 7 x 1 = 7
- What is a circular queue? Write the implementation of circular queues using arrays and also write the methods to perform insertion, deletion and display on it.
 - Explain various garbage collection and compacting techniques.
5. Attempt any *one* part of the following: 7 x 1 = 7
- What is tree data structure? Explain different ways to traverse a Tree.
 - Define AVL tree. Explain the different types of rotation done in AVL tree.

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Define Searching. What do you mean by Linear Search and Binary Search explain it with its complexity?
- (b) Write Short Note on (1) Heap Sort & (2) Bubble Sort along with their comparison and analysis?

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) What are the different ways the graph is represented in computer memory? Explain with suitable example.
- (b) Explain the minimum spanning tree algorithms with an example.