

**K J SOMAIYA INSTITUTE OF MANAGEMENT STUDIES AND
RESEARCH
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**Batch : MCA 2016-2019
SEMESTER II
SUBJECT : DATA STRUCTURES
(END-SEMESTER EXAMINATION)**

Max. Marks: 50

Duration: 3 hours

April 17, 2017

Instructions:

Question No. I is compulsory.

Answer any two Questions from the remaining three questions.

Specify assumptions made wherever necessary.

- 1) a) Write **ONLY** the QuickSort() method for a **class Sort**. Assume the class has a dynamic integer array called “arr” with “size” number of elements and that all other necessary methods are defined. You need not write function main() either. [10 Marks]
- b) Draw an AVL tree for the following keys coming in sequence :
40, 39, 55, 26, 50, 72, 60, 90, 58
At any point of imbalance :
i) Mention the youngest ancestor
ii) The case and the sub-case that the imbalance falls under, and
iii) Show the tree after balancing it [10 Marks]
- c) Show a snapshot of the array after **two** passes of : [10 Marks]
i) Insertion Sort
ii) Selection Sort and
iii) Bubble Sort (least value bubbling to the first position).
The data for array is given below :
11, 13, 7, 10, 33, 26, 90, 65, 70
- 2) a) i) State the properties of a B-Tree. [5 Marks]
ii) Draw a B-Tree of order 3 for the following keys coming in sequence. Show the tree at each step of insertion :
29, 8, 27, 99, 19, 32, 51, 41.
iii) Now delete 41 and 99 and show the tree after each deletion.
- b) Write **ONLY** the deleteNode() method of a Binary Search Tree for a class BinTree. Assume the structure BTree consists of only an integer data with

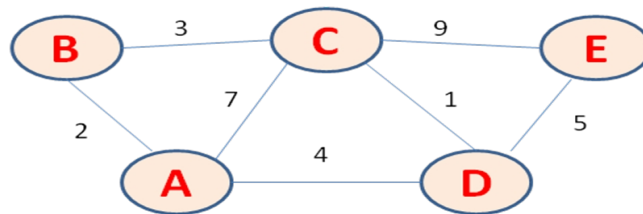
two self referential pointers left and right. Assume the class has as private data, a root pointer of type BTree and an integer count which holds the number of nodes in the tree. Also assume all other methods including main() is already defined. [5 Marks]

3) a) Write **ONLY** the **reheapDown()** method for a class Heap. Assume it has as private data, a dynamic integer array “arr” with “size” number of elements. Assume all other methods including main() are defined. [5 Marks]

b) Using the **digit extraction method (1st, 3rd and 5th)** for hashing and **linear probing** method for collision resolution, store the keys given below in an array of 19 elements. How many collisions occurred ? Determine the density of the list : [5 Marks]

224562, 137456, 214562, 140145, 214576, 162145.

4) a) State the principles for deriving a Minimum Spanning Tree (MST). Consider the weighted undirected graph given below. Draw the MST for the graph below Using Prim’s method : [5 Marks]



b) Ignoring the weights of the graph given above, state :
i) the depth-first-traversal and
ii) the breadth-first-traversal. [5 Marks]
