

**DEPARTMENT OF CSE, JNTUH COLLEGE OF ENGG HYDERABAD**

**B.Tech II/IV –II Semester, 2016-17**  
**DESIGN AND ANALYSIS OF ALGORITHMS**

**ASSIGNMENT – 1**

1. M is an  $n \times n$  integer matrix in which the entries of each row are in increasing order from left to right and the entries in each column are in increasing order top to bottom. Give an efficient algorithm to find the position of integer x in M or determine x is not there. What is the asymptotic complexity of your algorithm.
2. Will Dijkstra's Shortest path finding algorithm work correctly if weights may be negative. Justify your answer by an argument or counter example.
3. Give an efficient in-place algorithm to rearrange an array of n elements so that all the negative keys precede all the nonnegative keys. How fast is your algorithm
4. Merging lists You want to collect sorted lists from different databases and merge them into a single sorted list. The cost to merge a list of size  $l_1$  with one of size  $l_2$  is  $l_1 + l_2$ , and creates a new list of size  $l_1 + l_2$  replacing the old ones. You are given as input the sizes of n lists  $l_1, ..l_n$  and need to schedule merges in order to unite them into a single list. You wish to minimize the total cost for all merges. Give an efficient algorithm that, given  $l_1, ..l_n$ , finds the lowest cost schedule to merge lists of those sizes.
5. Consider the Sorting Algorithms MergeSort, QuickSort, Insertion Sort and obtain the actual running times for  $n=10, 20, 50, 100, 150, 200, 250, 300, \dots, 1000$ . Plot the execution times obtained

**(Last date for submission March10, 2017)**