Part II

1. Implement a Max-Heap Data Structure where the key elements (which are positive integers) may not be distinct. The following operations are required to be developed efficiently: Insert and Remove-Max-All. Remove- Max-All removes all copies if there are multiple key elements which are the largest and returns the key value and number of elements removed. You are to present the following in an efficient manner:

   (a) Explain your Representation of Max-Heap using Arrays along with your proposed algorithms for Insert and Remove-Max-All in a few crisp sentences using clear non-trivial examples and diagrams covering all the different cases. Analyze the Space complexity.

   (b) Present formal algorithms for

      i. Insert(x): Inserting an element in the Heap with key value x. Analyze the time complexity.
      ii. Remove-Max-All. Analyze the Time complexity.

[5+(3+2) Marks]

All the best