**Institute of Engineering Science and Technology, Shibpur. Department of Information Technology**

Data Structure Laboratory 2020

BATCH- HY Due Date: 24.09.2020

**Assignment – 3**

1. Write a method duplicate Stack that returns a new stack containing the same elements and in the same order as the stack specified in the parameter. The method should create a new stack and fill it with the same data elements as the given stack. (You do not need to duplicate the contents of the elements.). Before the method finishes, it must restore the contents of the original stack to its original state (same contents in the same order).

Example:

Suppose the stack contains the elements : 10, 12, 10, 15, 20, 10, 15, 20, 25

So the duplicate stack should contain the elements: 10, 12, 15, 20, 25

Once this stack is created, display the contents of the stack and form this stack revert back to the original stack contents.

2. Sort the given set of elements present in three stack data structures and put them in a single stack, without using any other variable.

3. The priority queue will be a collection of strings. *Lexicographically* smaller strings should be considered higher priority than lexicographically larger ones. For example, "*ping*" is higher priority than "*pong*", regardless of insertion order.

Design the following functions:

i) ***enqueue*** is used to insert a new element to the priority queue.

ii) ***extractMin*** returns the value of highest priority (i.e., lexicographically smallest) element in the queue and removes it.

iii) ***merge*** unifies the queues and returns their union as a new queue.

4. In road traffic maintenance we know the traffic signal is used. Depending on the real time traffic a particular signal is made on/off for a few seconds. If we have the traffic data available then write a program in C to manage the traffic signal.

Consider there is a 5 road connector and you have to provide the signal for each of the roads. Generate the time for each traffic between 10 to 20 sec randomly and provide the signal for each of the roads one by one.

If for any reason one road is to be blocked then block that road and provide the signal for remaining roads as earlier.