**Indian Institute of Engineering Science and Technology, Shibpur**

**Department of Information Technology**

**Assignment 2 Due date: 8th September 2020**

1. Write a program to read the string of 0s and 1s from a given file. Then do the following.
   1. Break the string into the substrings ending with 1 and of length of consecutive n number of 0s or 1s. N can be 2, 3 and 4.

Example: Suppose you have a string “10000100100111110000100101000”. For n=4, the sub strings will be 1, 0000, 1, 001, 001, 1111, 0000,1, 001, 01, 0000.

* 1. Count the frequency of each substring. Calculate the length of the string using frequency and verify with the original string length.

Example: 1 occurs 2 times, 01 occurs 1 time, 001 occurs 3 times etc.

* 1. Replace each pattern substring with a character starting from A (for substring of length 1), B(for substring with length 2) etc. and put the characters in a separate file based on the position of the substring in the original string.

Example: 1 is replaced by A, 01 is replaced by B, 001 is replaced by C etc.

So the final string will be: AEACCFEACBE

* 1. Calculate the length of the new string and calculate the % reduction of length.

Example: New string is of length 11. You can now calculate the % reduction of length.

1. Do the addition and subtraction of two nxn sparse matrices using the efficient representation of the matrix done in the previous Assignment 1.