

Name: Raghav Maheshwari

Roll No: 53

Penel: A

## Theory Assignment - 2 (TOL)

Q1 What is Halting Problem of Turing machine? Explain in detail.

Ans Halting Problem is a problem of deciding or conducting based on a given arbitrary computer program and its input, whether program will stop executing or run in an infinite loop for given input.

Halting Problem tells that it is not easy to write a computer program that executes in limited time that is capable of deciding whether a program halts for an input. In addition to that Halting Problem now says that it is not practicable to determine whether a given program is going to halt (stop).

Example -

INPUT - Program P and a string S

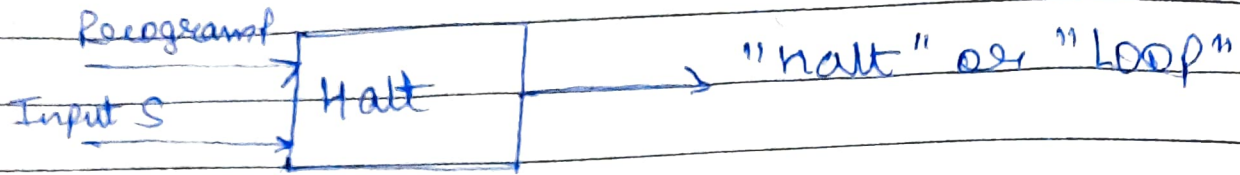
OUTPUT - If P stops on S, it returns 1

Otherwise if P enters into an endless loop on S, it returns 0.

Let us consider Halting Problem called H having solution. Now H takes following inputs -

- Program P
- Input S

If P stops on S then H results in "halt", otherwise H gives result "loop".



Q2 Design a TM to check for equal number of 0's and equal number of 1's over  $\{0, 1\}^*$ .

Ans  $L = \{01, 0011, 1010, 110100, \dots\}$   
 (B 001110B)

