

## CS21004, Tutorial 8

1. Construct a Turing machine which accepts the language-

$$C = \{a^i b^j c^k \mid i \times j = k \text{ and } i, j, k \geq 1\}$$

2. Construct a Turing machine for the language -

$$C = \{ww^R \mid w \in \{0, 1\}^*\}$$

3. Construct a Turing machine for the language -

$$C = \{\#x_1\#x_2\dots\#x_i \mid x_i \in \{0, 1\}^* \text{ and } x_i \neq x_j \text{ for each } i \neq j\}$$

4. Design a Turing machine to accept the following language-

$$L = \{w \in \{a, b, c\}^* \mid \#a(w) \leq \#b(w) \leq \#c(w)\}$$

Briefly describe the working of the machine and give the state transition table/diagram. Use the example *bcabcac* for illustration.

5. Give a detailed description (algorithm as well as the transition table) for a total Turing machine accepting the language:

$$L = \{a^n b^{\frac{n(n+1)}{2}} \mid n \geq 0\}$$

**Please provide the algorithm, states and transitions for all these questions as well as  $\{ww \mid w \in \{a, b\}^*\}$ , done in the class.**