

Quiz 2

CU2102 CG1103 Theory of Computation

Duration: 60 mins

Maximum Marks: 10

$u^* w^* u^*$

1. Give a 2-stack automaton accepting $\{www \mid w \in \{a, b\}^*\}$. (4 marks)

2. Let's recall *scattered subword* and $\min_{\preceq}(L)$ from the mid-sem exams.

Let $u, v \in \Sigma^*$ be two words. We say that u is a *scattered subword* of v (denoted $u \preceq v$) if $u = a_1 a_2 \dots a_n$ and $v = v_0 a_1 v_1 a_2 v_2 \dots a_n v_n$ for some $n \geq 0$ where $a_i \in \Sigma$ for $i \in \{1, 2, \dots, n\}$ and $v_i \in \Sigma^*$ for $i \in \{0, 1, \dots, n\}$. That is, u is obtained by "dropping" some letters from v .

Let $L \subseteq \Sigma^*$. Let $\min_{\preceq}(L) = \{w \mid w \in L, \forall u (u \in L \wedge u \preceq w) \Rightarrow u = w\}$. That is, it is the set of "minimal" words in L with respect to $\preceq$.

Consider the following language.

$$\{\langle M_1 \rangle, \langle M_2 \rangle \mid M_1, M_2 \text{ are Turing machines and } L(M_1) = \min_{\preceq}(L(M_2))\}$$

(a) Is it recursively enumerable?

F

(3 marks)

(b) Is it co - recursively enumerable?

T

(3 marks)