Fall-2017

1) a) $\{w : w$ contains the substring $101\}$

101 as substring.

$L = \{101, 0101, 11101, 0101, \ldots\}$

101

$\Rightarrow R.E = (0+1)^* 101 (0+1)^*$

b) $\{w : w$ contains atleast three 0's$\}$

$L = \{000, 11000, 01010, \ldots\}$.

$R.E = (0+1)^* 0 (0+1)^* 0 (0+1)^*$

c) $\{w : w$ contains atmost three 1's$\}$

$L = \{00, 100, 0, 110, 111, 0100, \ldots\}$.

$R.E = 0^* 1 0^* 1 0^* 1 0^*$

d) $\{w : |w| \geq 3\}$

$L = \{000, 111, 1001, \ldots\}$

$(0+1)^* (0+1)(0+1)(0+1)^*$

e) $\{w : |w| \leq 3\}$

$L = \{0, 00, 11, 01, 111, \ldots\}$

$(0+1+\varepsilon)(0+1+\varepsilon)(0+1+\varepsilon)$.

f: {w : w starts and ends with different symbols}

L = {10, 01, 001, 1001, ---}.

$0(0+1)^*1 + 1(0+1)^*0$

(Doubt).

g:- {w : every odd position of w is 0}.

L{~~0101001~~, ε, 0, 01, 010

~~0(0+1)*0 1 0e*~~

~~(0(0+1)*ε*)~~

=> $(0(1+0))^*(0+ε)$ / or $(0(0+1))^*$

ε, 00,

h) {w : w does not contain exactly two 1's}.

$ε + 0^*10^* +$ ~~$0^*10^*10^*$~~

$0^*10^*10^*10^*1^*0^*$

i) {w : every 0 in w followed by TWO 1's}

$(1^*011 1^*)^*$

j) {w : w starts with substring 011 and contains the substring 110}.

$011(0+1)^*110(0+1)^*$

2) Turing machine that decides the following language $\Sigma = \{0,1\}$

$L = \{w : w$ Contains an even no of occurrence of substring 011 and $|w|$ is odd$\}$.