Assignment-02

CSE 331

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sec: 03

course: CSE331

Ans. to the Q.no.1

a) given that,

$L = \{ w \in \{0,1\}^* : ww^R$ and w^R means w in reverse$\}$

Let, L is a regular language
and pumping length = P.

$w = 0^P 1^P$
$w^R = 1^P 0^P$
$s = 0^P 1^P 1^P 0^P$
$\Delta P > P$
x consist of 0's
y " " 0's

When, $i = 1$, $s^1 = xyz$
$= 0^P 1^P 1^P 0^P$

$i = 2$, $s^{11} = xyyz$
$= 0^P 0^{|y|} 1^P 1^P 0^P \notin L$

∴ So, L is not a regular language.

b) given that

$L = \{ w \in \{a,b\}^* : w = b^n a^m$ where $n > m$, $m \geq 0\}$

let, L is a regular language.
and pumping length = P.

$w = b^{P/4} \cdot R^{P/2}$

$\frac{5P}{4} > P.$

x and y consist of both a and b's

P.T.O

$i=1, \quad s^1 = b^{3p/4} \cdot R^{p/2}$

$i=2, \quad s'' = b^{3p/4} \cdot a^{p/4} \; b^m a^n \cdot a^{1/4}$

which $\notin L$ ∵ Here m and n can be p, z $m+n=|y|$.

∴ L is not a regular language.

c) given that,

$L = \{w \in \{0,1,2,3\}^* : w = 1^n 0^m 3^n 2^m$ where, $n, m \geq 0\}$

let, L is a regular language.

and pumping length $= p$

$w = 1^p 0^1 3^p 2^1$

$2p+2 > p$.

x consist of 1's

y " " 1's

∴ $i=1, \; s' = 1^p 0^1 3^p 2^1$

$i=2, \; s'' = 1^p 1^{|y|} 0^1 3^p 2^1$

$=$ which $\notin L$

∴ L is not a regular language.

Ans. to the Q.no.2

a) given that,

$L = \{x\#y : x, y \in \{0,1\}^* \text{ and } |x| = |y| \text{ and the length of } x \text{ is odd}\}$

$S \rightarrow A\#A$

$A \rightarrow 0B \mid 1B$

$B \rightarrow 0A \mid 1A \mid \varepsilon$

b) given that,

$L = \{w \in \{a,b\}^* : w \text{ contains odd numbers of } b's\}$

$S \rightarrow bbbbxyz$

$x \rightarrow bx \mid b$

$y \rightarrow bbya \mid \varepsilon$

$z \rightarrow cz \mid \varepsilon$

$n = 2m+q+1$

$b^{2m+q+1} \; a^m c^b$

$b^q . b^y . b^{em} a^{m+1}$

(c) given that,

$L = \{w \in \{a,b,c\}^* : w = b^n a^m c^p$ where $n > 2m+4$, $m, p \geq 0\}$

$S \rightarrow BAC$

$B \rightarrow bbbbbD$

$D \rightarrow bbD \mid E$

$E \rightarrow bE \mid \varepsilon$

$A \rightarrow aA \mid \varepsilon$

$C \rightarrow cC \mid \varepsilon$

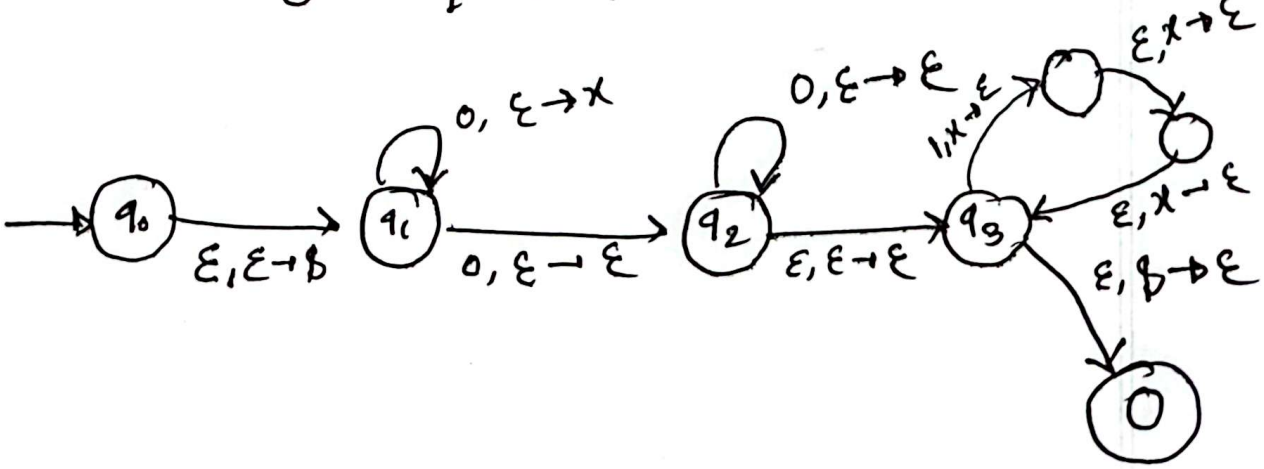
Ans. to the Q. no. 3

(a) given that,

$L = \{w \in \{0,1\}^* : w = 0^n 1^m$ where $n > 3m, m \geq 0\}$

$n = 3m + 1$

$\therefore 0^{3m+1} 1^m = 0^{3m} \; 0^1 \cdot 1^m.$



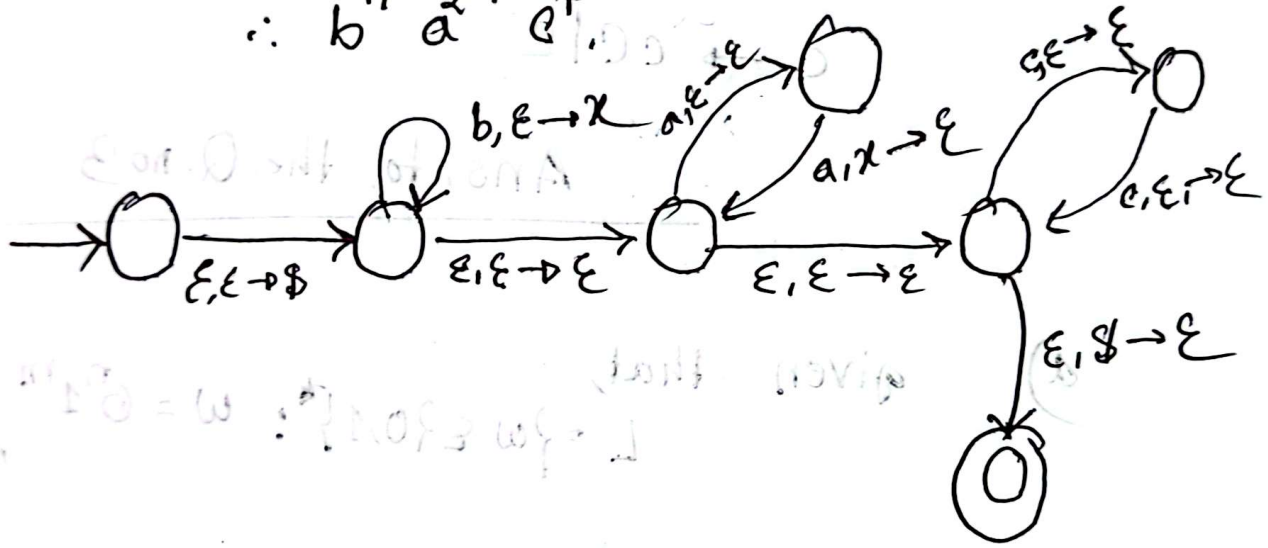
b) given that,

$L = \{w \in \{a,b\}^* : w = b^n a^m e^p$ where $m = 2n$, p is even, $m \geq 0\}$

~~n gm+1~~

$m = 2n$ p is even

$\therefore b^n a^{2n} e^p$



c) given that,

- $L = \{w \in \{0,1\}^* : w$ starts and ends with different symbols$\}$