Assignment - 01 (Part - A)

Submitted by: TASNIM RAHMAN MOUMITA

ID : 22301689

Course code : CSE331

Course Title : Automata & Computability

Section : 20

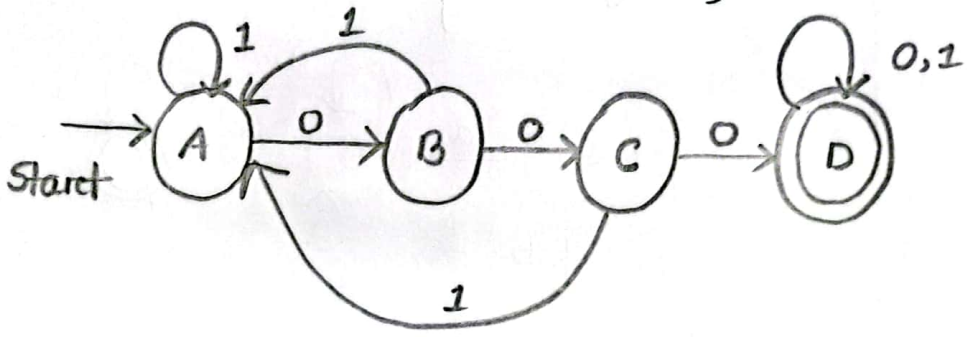
No. of group member : 01 (solo)

Date of submission : 18. 02. 2025

Ans. to the Q. NO - 01 (a)

Given,

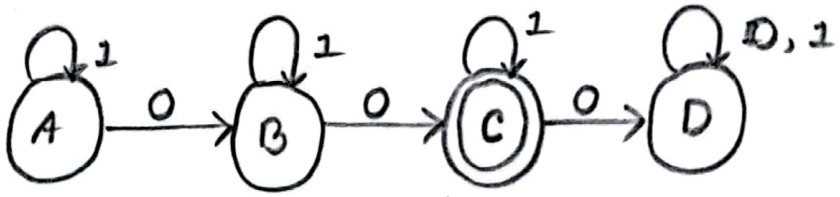
" Draw a DFA for the set of strings that have three consecutive 0s. $\Sigma = \{0, 1\}$



Ans. to the Q. NO - 01 (b) (or)

Given,

" Draw a DFA for the set of strings that don't have 000. $\Sigma = \{0, 1\}$ "

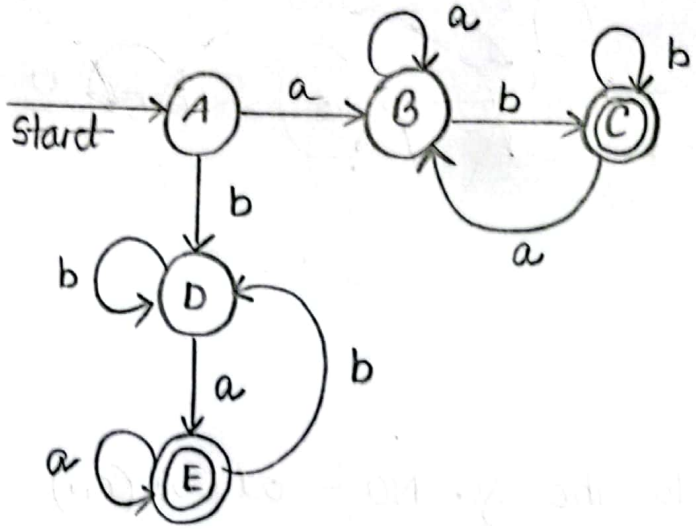


[P.T.O.]

Ans. to the Q. NO - 02 (a)

Given,

$L = \{ \omega \in \{a, b\}^* : \omega$ starts and ends with different symbols: $\}$



two options:

→ a b

→ b a

rough : for (ab)

aab ✓

aaaaab ✓

abbbb ✓

abab ✓

rough : for (ba)

bba ✓

bbba ✓

baaaaa ✓

baba ✓

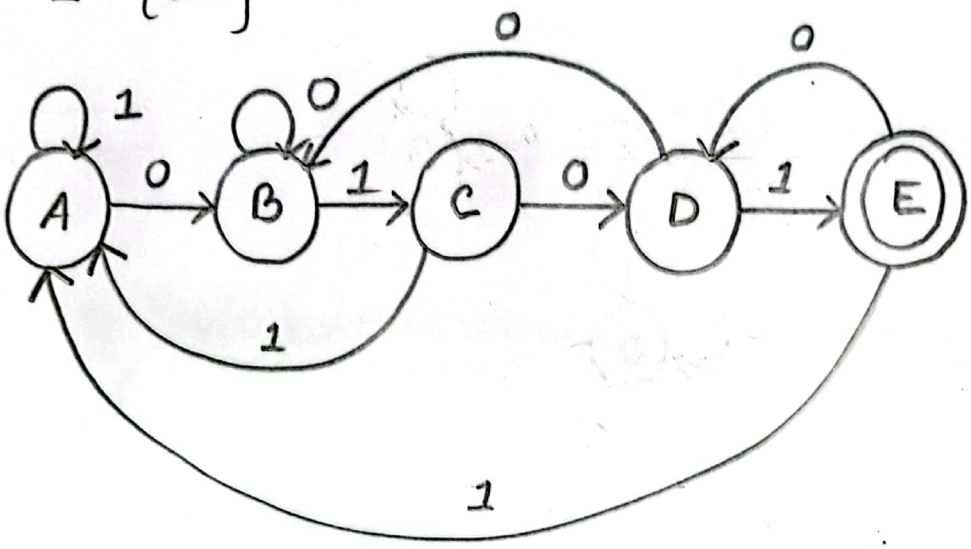
[P.T.O.]

Ans. to the Q. NO-03 (a)

Given,

DFA of strings that ends with "0101".

$\Sigma = \{0, 1\}$

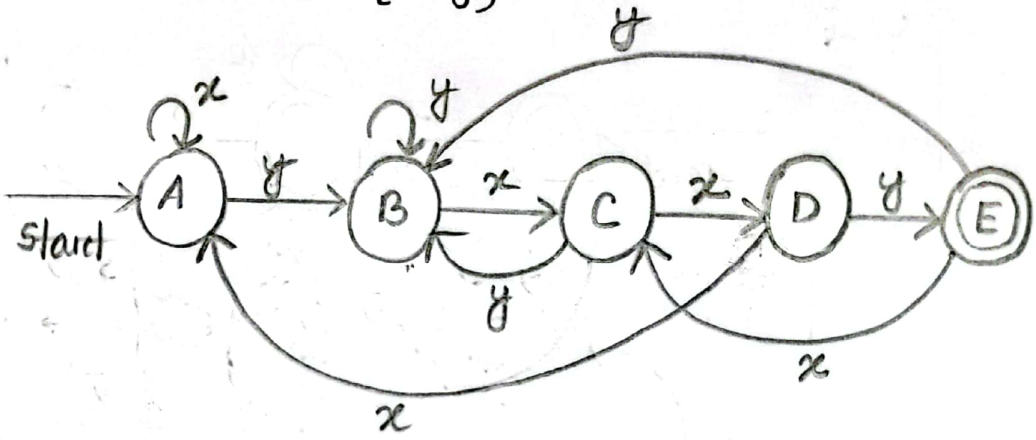


[P.T.O.]

Ans. to the Q. NO - 03 (b)

Given,

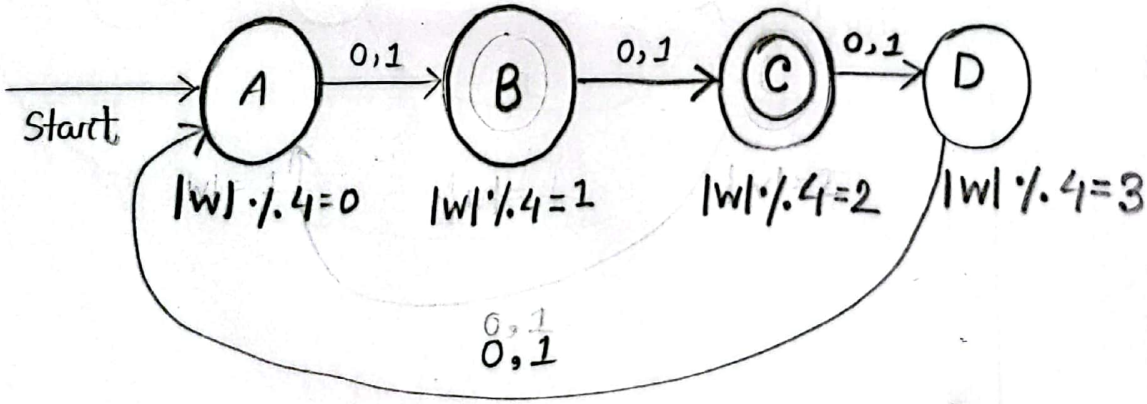
$L = \{\omega / \omega$ ends with the substring "yxxy"$\}$ over the alphabet $\{x, y\}$.



Ans. to the Q. NO - 04 (a)

Given,

$L = \{\omega \in \{0,1\}^* :$ the length of ω is two more than multiple of four$\}$ | $4n+2$

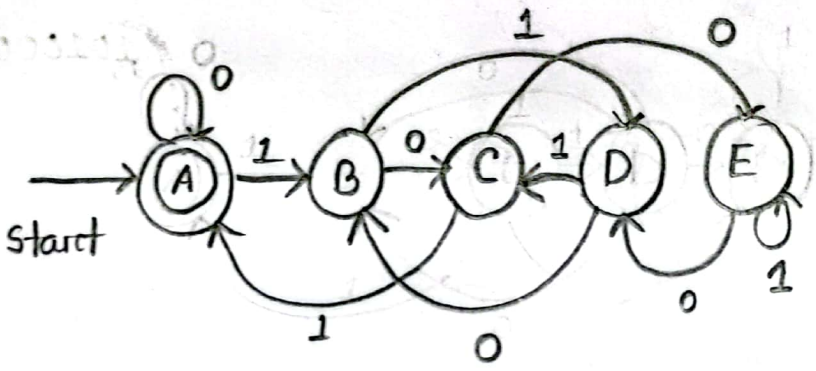


[P.T.O.]

Answer to the Q. NO - 05

Given,

$L = \{w \in \{0,1\}^* : w$, when interpreted as a binary number, is divisible by 5.$\}$



Rough:

divisible by 5
(0, 1, 2, 3, 4)

5 → 101
10 → 1010
15 → 1111
20 → 10100
25 → 11001
75 → 1001011

if we add 0, number gets doubled

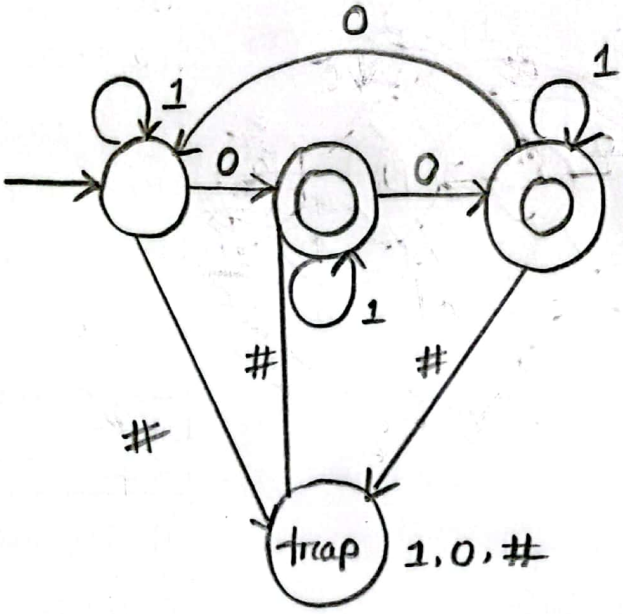
if we add 1, number gets doubled and added with 1.

P.T.O.

Ans. to the Q. NO - 06 (a)

Given,

$L = \{\omega \in \{0,1,\#\}^* : w$ does not contain # and the number of 0s in w is not a multiple of 3$\}$



1010001 1 ∈ L

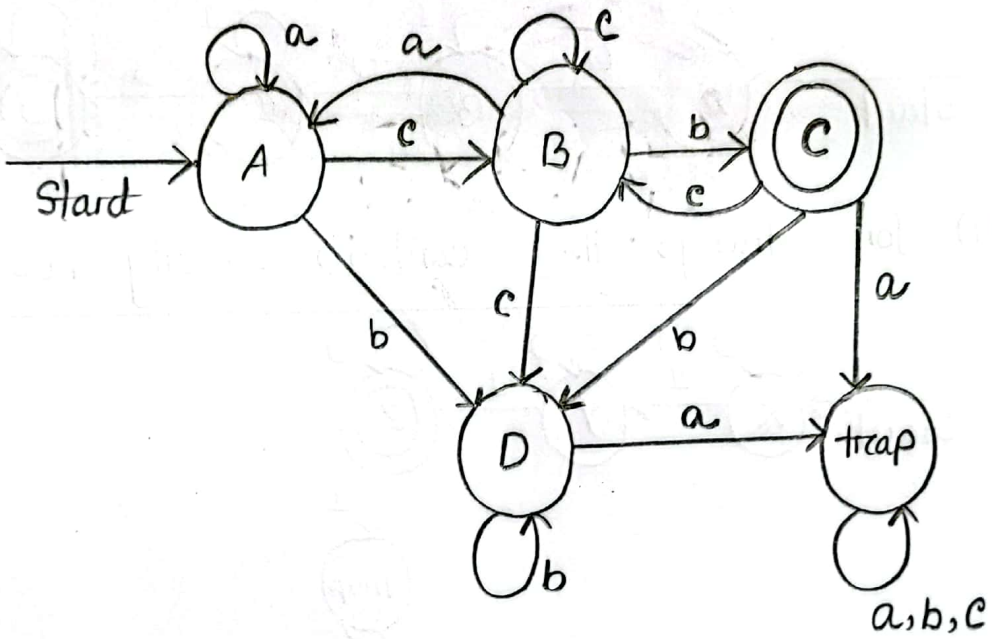
[P.T.O.]

Ans. to the Q. NO-07

Given,

$L = \{\omega | \omega$ does not contain "ba" and ends with "cb"$\}$

L over the alphabet $\Sigma = \{a, b, c\}$



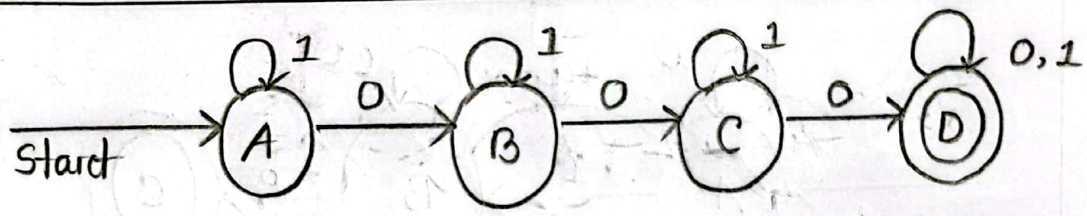
[P.T.O.]

Ans. to the Q. NO - 08

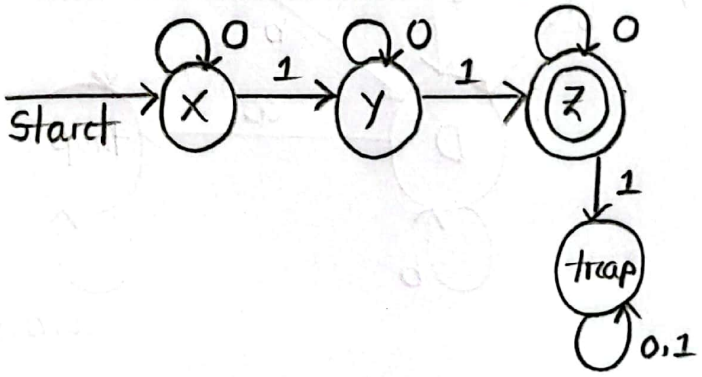
Given,

L = DFA of strings that contains at least three 0s or exactly two 1s. $\Sigma = \{0, 1\}$.

DFA for strings that contains at least three 0s:

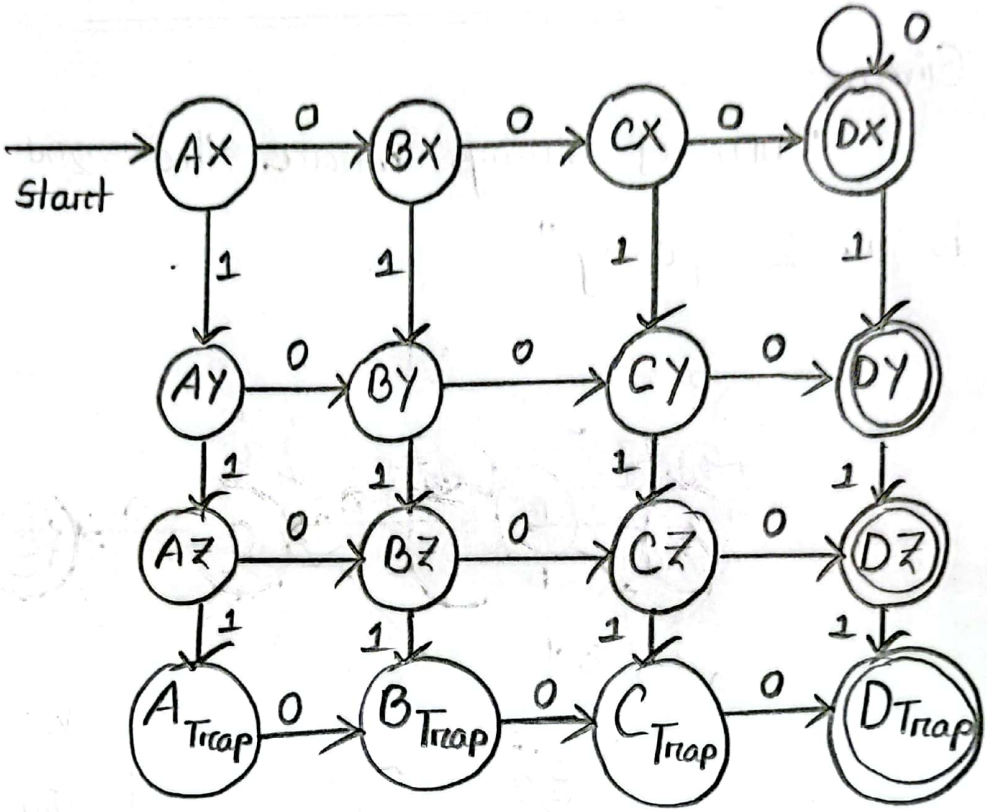


DFA for strings that contains exactly two 1s:



DFA for given L:

[Please turn Over]


Start
AX
BX
CX
DX
AY
BY
CY
DY
AZ
BZ
CZ
DZ
A Trap
B Trap
C Trap
D Trap
0
1

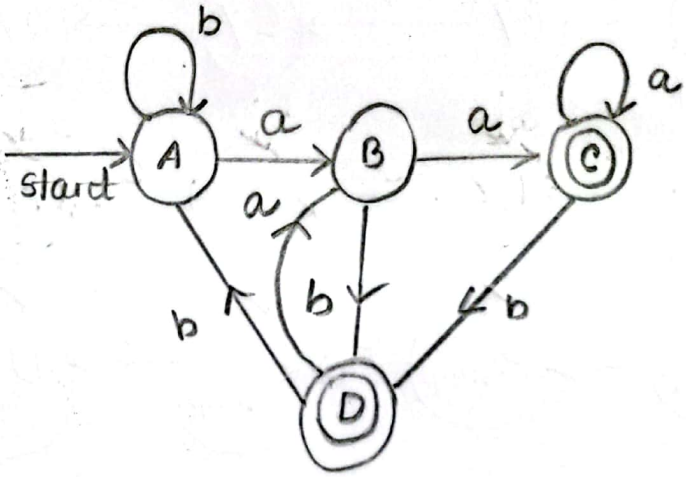
[P.T.O.]

Ans. to the Q. NO - 09 (a)

Given,

"DFA of strings where the 2nd last symbol is a. $\Sigma = \{a, b\}$"

aa
ab



We know,

Total no. of states in a DFA $= 2^n$

$\because (n=2), \quad = 2^2$

$= 4.$

$\therefore$ Final states $= 2^{n-1}$

$= 2^{2-1}$

$= 2^1$

$= 2$

[P.T.O.]

Ans. to the Q. NO - 10

Given,

$$L = \{ \omega \in \{a,b\}^* : \text{the last letter of } \omega \text{ appears at least twice in } \omega \}.$$