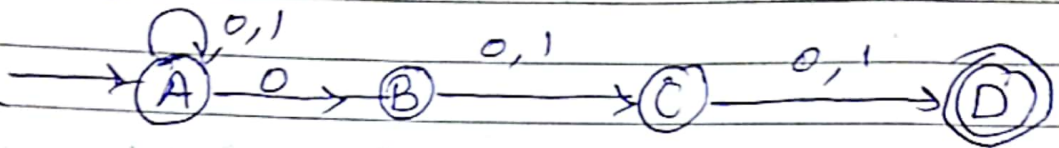


# Tutorial - 4

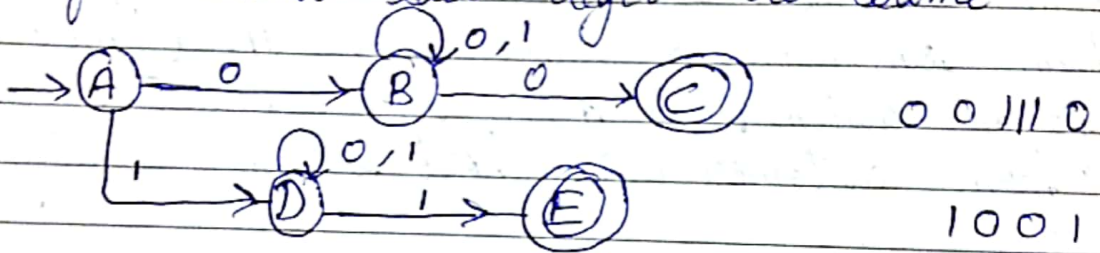
## Krithika Balamurugan

① Construct a NFA to accept strings over alphabet  $\Sigma = \{0, 1\}$

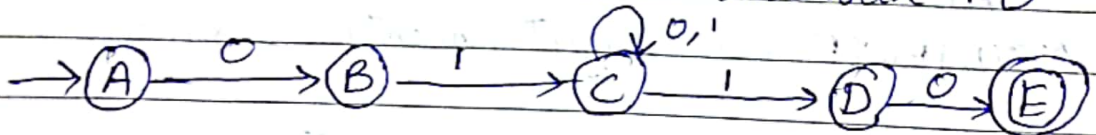
a. The 3<sup>rd</sup> symbol from the right end is 0.



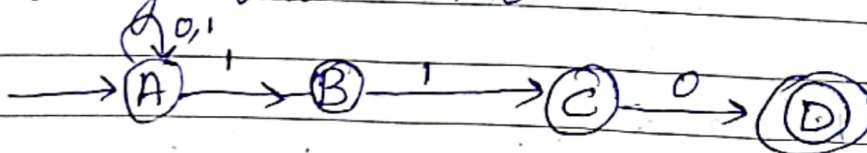
b. The first and last digit are same.



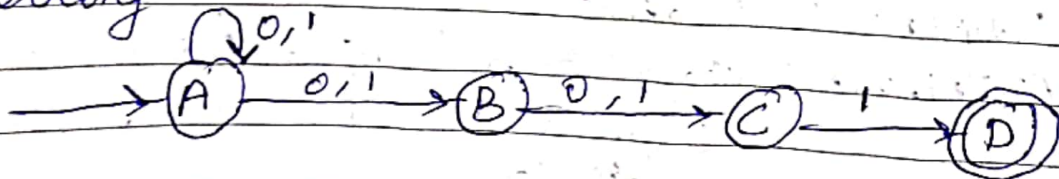
c. Start with 01 and end with 10



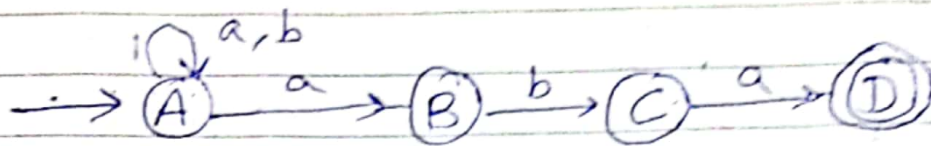
d. Ending with 110



e. 0 as one of last three character in the string



2. Design a NFA to accept strings over alphabet  $\Sigma = \{a, b\}$  ending with aba.  
Convert NFA to DFA

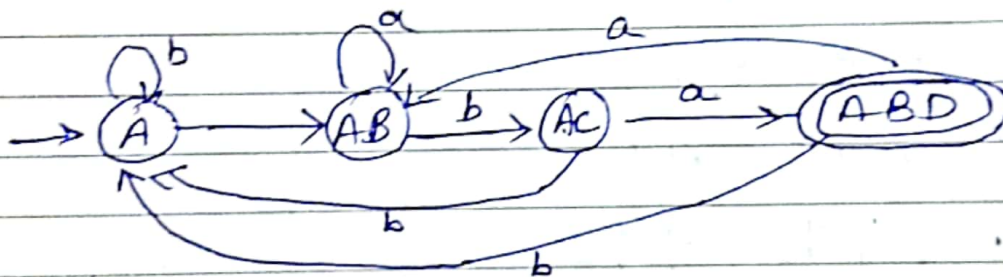


NFA To DFA

DFA  $\phi$

	a	b
A	A, B	A
B	$\phi$	C
C	D	$\phi$
D	$\phi$	$\phi$

A	a	b
AB	AB	AC
<del>A</del>	ABD	A
A BD	AB	A
$\phi$		



$\rightarrow$  abaaba

A  $\rightarrow$  AB  $\rightarrow$  AC  $\rightarrow$  ABD  $\rightarrow$  AB  $\rightarrow$  A  $\rightarrow$  ABD

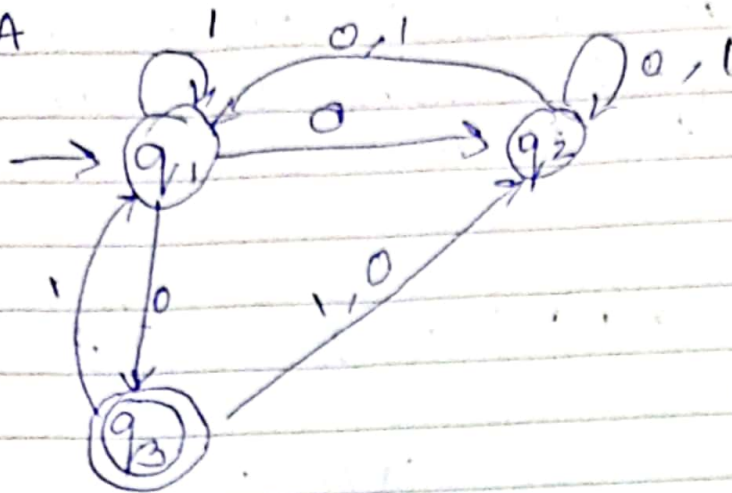
3. Let  $M = \{q_1, q_2, q_3\}, \{0, 1\}, \{q_1\}, \{q_3\}$  is an NFA where  $\delta$  is given as

$$\begin{aligned}
 \delta(q_1, 0) &= \{q_2, q_3\} \\
 \delta(q_1, 1) &= \{q_1\} \\
 \delta(q_2, 0) &= \{q_1, q_2\} \\
 \delta(q_3, 0) &= \{q_2\} \\
 \delta(q_2, 1) &= \{q_1, q_2\} \\
 \delta(q_3, 1) &= \{q_1, q_2\}
 \end{aligned}$$



U19CS076

NFA

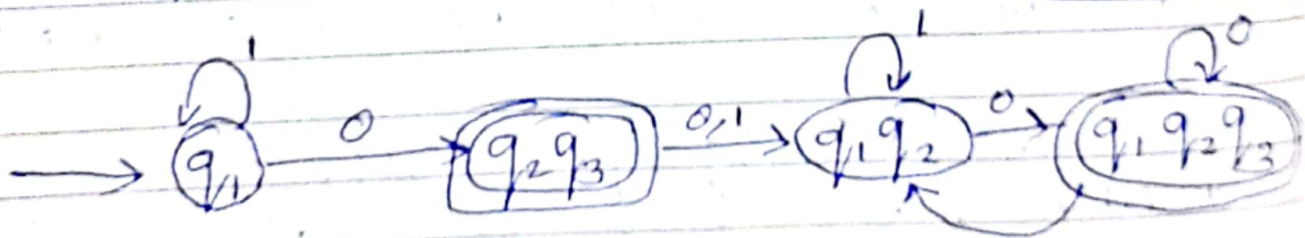


→ 1010 ✓  
 → 111000 ✓  
 → 11101 ✗

NFA	0	1
$q_1$	$\{q_3, q_2\}$	$q_1$
$q_2$	$\{q_1, q_2\}$	$\{q_1, q_2\}$
$q_3$	$q_2$	$\{q_1, q_3\}$

DFA	0	1
$q_1$	$q_2, q_3$	$q_1$
$q_2, q_3$	$q_1, q_2$	$q_1, q_2$
$q_1, q_2$	$q_1, q_2, q_3$	$q_1, q_2$
$q_1, q_2, q_3$	$q_1, q_2, q_3$	$q_1, q_2$

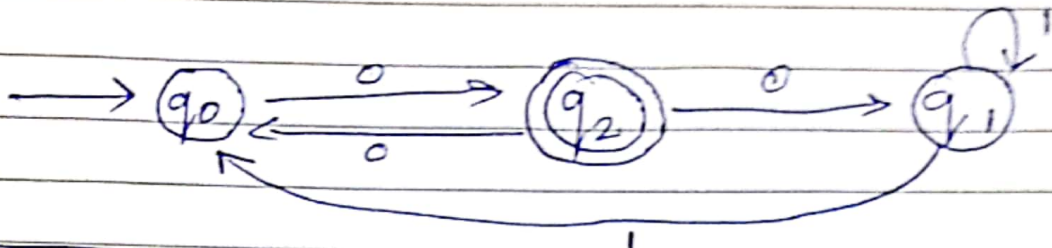
1010 ✓  
 111000 ✓  
 11101 ✗



4. Construct the transition table for NFA. Convert a NFA to equivalent DFA.

19CS076

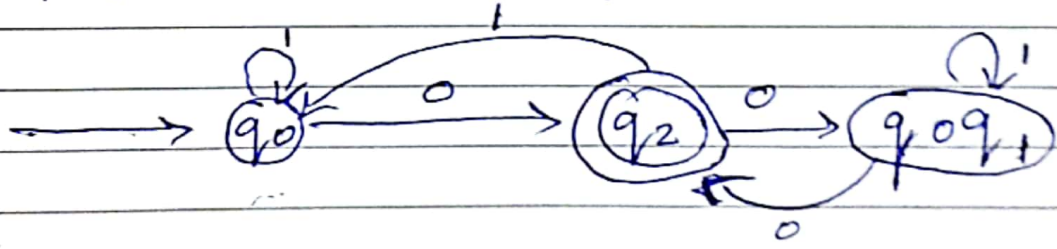
	0	1
$q_0$	$q_2$	$\emptyset$
$q_1$	$\emptyset$	$\{q_0, q_1\}$
$q_2$	$\{q_0, q_1\}$	$q_0$



$\rightarrow 0$	✓ Accept
$\rightarrow 000110$	✓ Accept
$\rightarrow 0001$	✗ Not Possible

DFA

	0	1
$q_0$	$q_2$	$q_1$
$q_1$	$q_0, q_1$	$q_0$
$q_2$	$q_2$	$q_0, q_1$



$\rightarrow 0$	✓
$\rightarrow 000110$	✓
$\rightarrow 0001$	✗