BRAC UNIVERSITY

Merul Badda, Dhaka, Bangladesh

CSE331 : Automata and Computability
Quiz 1
Summer 2024

Duration: 30 minutes **CO1** **Total: 20 marks**

Name: Radia Rahman	ID: 22299495	Section: 21

$L_1 = \{w \in \Sigma^* \mid w$ starts with 10$\}$, where $\Sigma = \{0, 1\}$

$L_2 = \{w \in \Sigma^* \mid w$ contains an even number of 0s$\}$, where $\Sigma = \{0, 1\}$

DFA

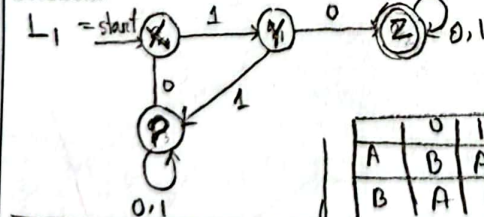1. Draw the state diagram of the DFA for the following regular languages: (5 x 2 = 10 marks)

$L(M) \rightarrow L_2$
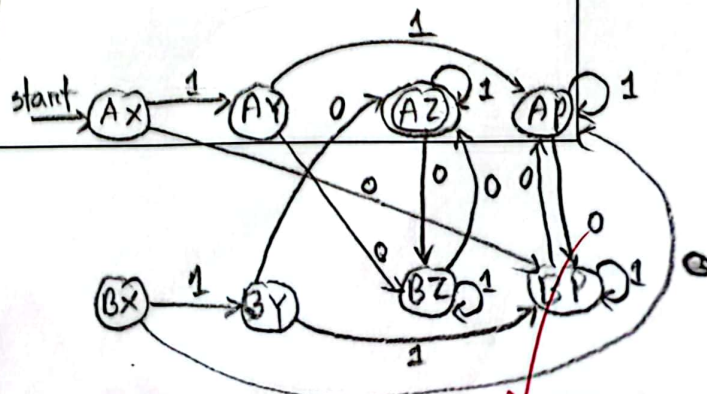
Solution:

$L(M) \rightarrow L_1 \cap L_2$

Solution:

$(A, 0 = B, (x, 0) = P \mid Ax, 0 = BP$ $(A, 1) = A, (x, 1) = Y$ $Ax, 1 = AY$
$(Y, 0) = Z \mid AY, 0 = BZ$ $(Y, 1) = P \mid AY, 1 = AP$
$(Z, 0) = Z \mid AZ, 0 = BZ$ $(Z, 1) = Z \mid AZ, 1 = AZ$
$(P, 0) = P \mid AP, 0 = BP$ $(P, 1), P \mid AP, 1 = AP$

$(B, 0) = A, (x, 0) = P \mid Bx, 0 = AP$ $(B, 1) = B, BX, 1 = BY$
$(Y, 0) = Z \mid BY, 0 = AZ$ $BY, 1 = BP$
$(Z, 0) = Z \mid BZ, 0 = AZ$ $BZ, 1 = BZ$
$(P, 0) = P \mid BP, 0 = AP$ $BP, 1 = BP$

	0	1
A	B	A
B	A	B

	0	1
X	P	Y
Y	Z	P
Z	Z	Z
P	P	P

	X	Y	Z	P
A	AX	AY	AZ	AP
B	BX	BY	BZ	BP

NFA

2. Construct the NFA for the following regular languages: (5 marks)

L(M) → {w ∈ Σ* | w contains bab or bb}, where Σ = {a, b} using only 4 states.

Solution:
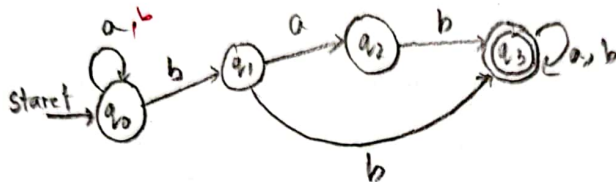
NFA → DFA

3. Convert the following NFA into equivalent DFA:
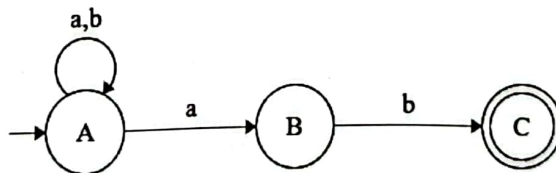
Solution:

Table for DFA:

state	a	b
P ∈ {A}	{A, B} (Q)	{A} (P)
Q = {A, B}	{A, B} (Q)	{A, C} (R)
R = {A, C}	{A, B} (Q)	{A} (P)
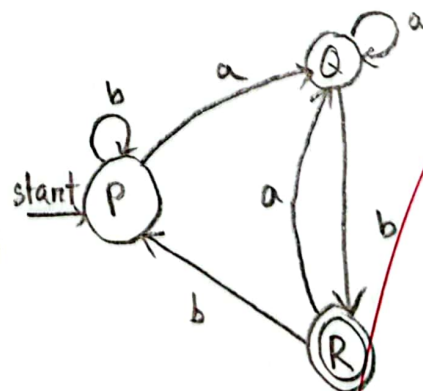
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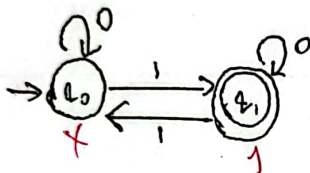| Name: NAKSHATRA Roy	ID: 22299245	Section: 19

$L_1 = \{w \in \Sigma^* \mid w \text{ starts with } 10\}$, where $\Sigma = \{0, 1\}$

$L_2 = \{w \in \Sigma^* \mid w \text{ contains an odd number of 1s}\}$, where $\Sigma = \{0, 1\}$

DFA

1. Draw the state diagram of the DFA for the following regular languages: (5 x 2 = 10 marks)
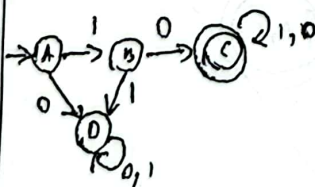
$L(M) \rightarrow L_2$

Solution:

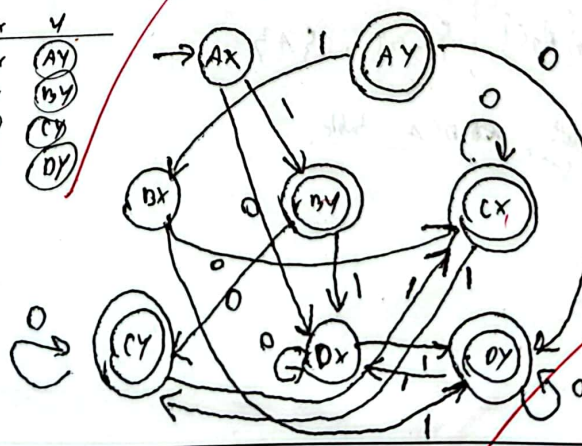**$L(M) \rightarrow L_1 \cup L_2$**

Solution:

$L(M) \rightarrow L_1$

$L(M) \rightarrow L_2$

	x	y
A	AX	AY
B	BX	BY
C	CY	CY
D	DX	DY

	0	1
X	X	Y
Y	Y	X

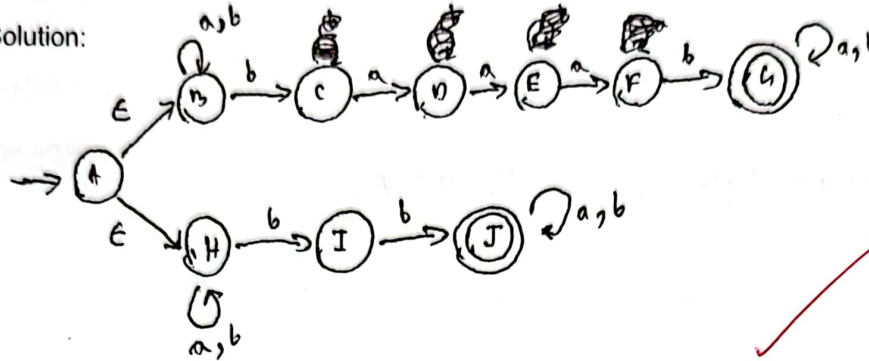|	0	1
A	D	B
B	C	D
C	C	C
D	D	D

if $w = 010 \leftarrow$ odd nbr of 1s
still accepted
so correct

NFA

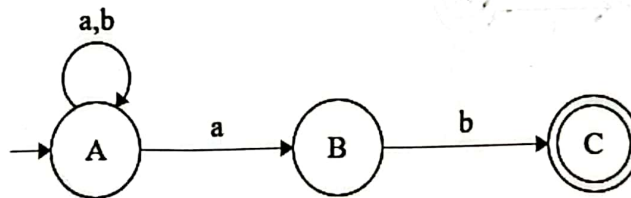2. Construct the NFA for the following regular languages: (5 marks)

L(M) → {w ∈ Σ* | w contains baaab or bb}, where Σ = {a, b}.

Solution:

NFA → DFA

3. Convert the following NFA into equivalent DFA:

Solution:

state	a	b
↓ {A}	{A,B}	{A}
{A,B}	{A,B}	{A,C}
↑ {A,C}	{A,B}	{A}

end state   NEW DFA table