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AT TUTORIAL NO: 3

Q.1] Construct DFA that accept set of all strings over $\Sigma = \{0, 1\}$ such that:-

(a) Every 0 is followed by 11.

Ans: $M = (Q, \Sigma, \delta, q_0, F)$

$Q = q_0 \longrightarrow$ String ending in 0

$q_1 \longrightarrow$ String ending in 1

$q_2 \longrightarrow$ String ending in 01

$q_3 \longrightarrow$ String ending in 011

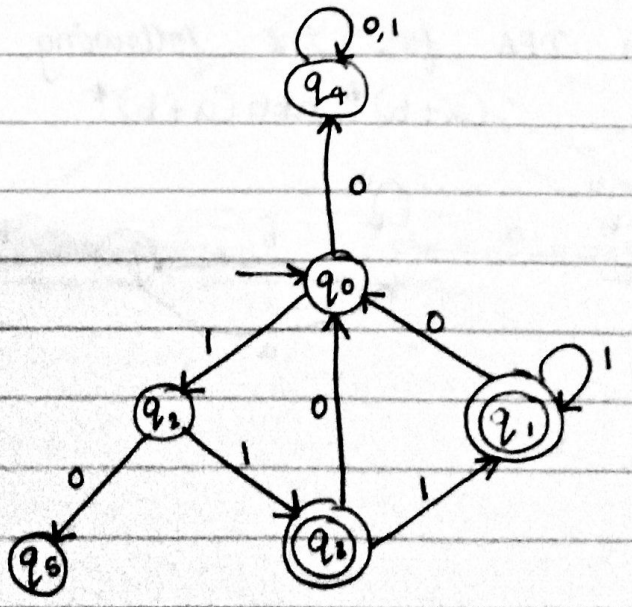
$q_4 \longrightarrow$ String ending in 00

$q_5 \longrightarrow$ String ending in 010

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

$\delta : Q \times \Sigma \longrightarrow Q$

Q \ Σ	0	1
→ q_0	q_4	q_2
* q_1	q_0	q_1
q_2	q_5	q_3
* q_3	q_0	q_1
q_4	q_4	q_4
q_5	q_5	q_5



(b) String do not contain the substring 010.

Ans. $M = (Q, \Sigma, \delta, q_0, F)$

$Q = q_0 \longrightarrow$ String ending in 0

$q_1 \longrightarrow$ String ending in 1

$q_2 \longrightarrow$ String ending in 01

$q_3 \longrightarrow$ String ending in 010

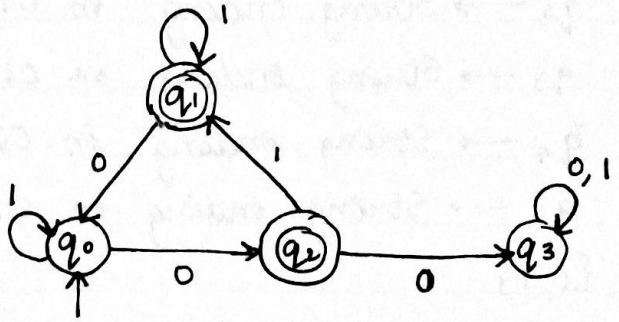
$\Sigma = \{0, 1\}$

$\delta : Q \times \Sigma \longrightarrow Q$

$q_0 \longrightarrow$ initial state

$F = \{ q_1, q_2 \}$

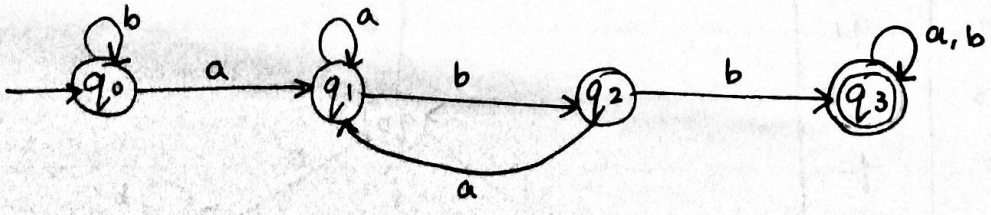
Q \ Σ	0	1
$\rightarrow q_0$	q_0	q_2
$* q_1$	q_0	q_1
$* q_2$	q_3	q_1
q_3	q_3	q_3



Q.2] Design DFA for the following R.E

$(a+b)^* \; abb \; (a+b)^*$

Ans.



Q3] Design DFA over {0,1} which accepts all strings that contain substring '11' and do not contain the substring '00'

Ans $M = (Q, \Sigma, \delta, q_0, F)$

Q : q_0 → string ending in 0
q_1 → string ending in 1
q_2 → string ending in 11
q_3 → string ending in 00
q_4 → string ending in 110

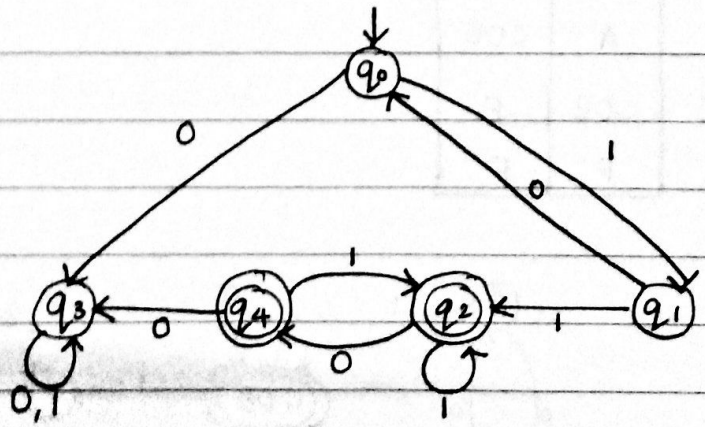
$\Sigma = \{0, 1\}$

$\delta : Q \times \Sigma \rightarrow Q$

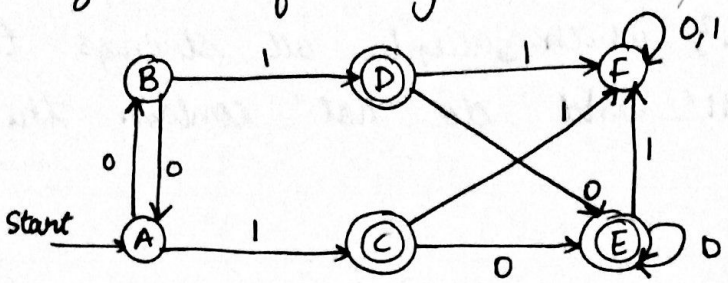
q_0 : initial state

$F = \{q_2, q_4\}$

Q \ Σ	0	1
q_0	q_3	q_1
q_1	q_0	q_2
q_2	q_4	q_2
q_3	q_3	q_3
q_4	q_3	q_2



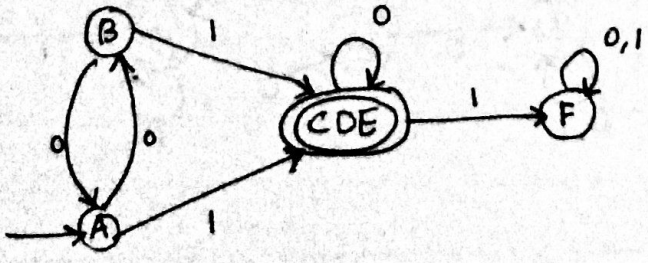
Q.4] Minimize the following DFA:-



Ans.

q \ Σ	0	1
A	B	C
B	A	D
C	E	F
D	E	F
E	E	F
F	F	F

q \ Σ	0	1
A	B	CDE
B	A	CDE
CDE	CDE	F
F	F	F



Q.5] Minimize the following DFA:-

	→q_0	q_1	q_2	*q_3	q_4	*q_5
0	q_1	q_3	q_5	q_3	q_5	q_3
1	q_2	q_4	q_1	q_4	q_1	q_4

Ans:

Q \ Σ	0	1
→q_0	q_1	q_2q_4
q_1	q_3q_5	q_2q_4
q_2q_4	q_3q_5	q_1
*q_3q_5	q_3q_5	q_2q_4