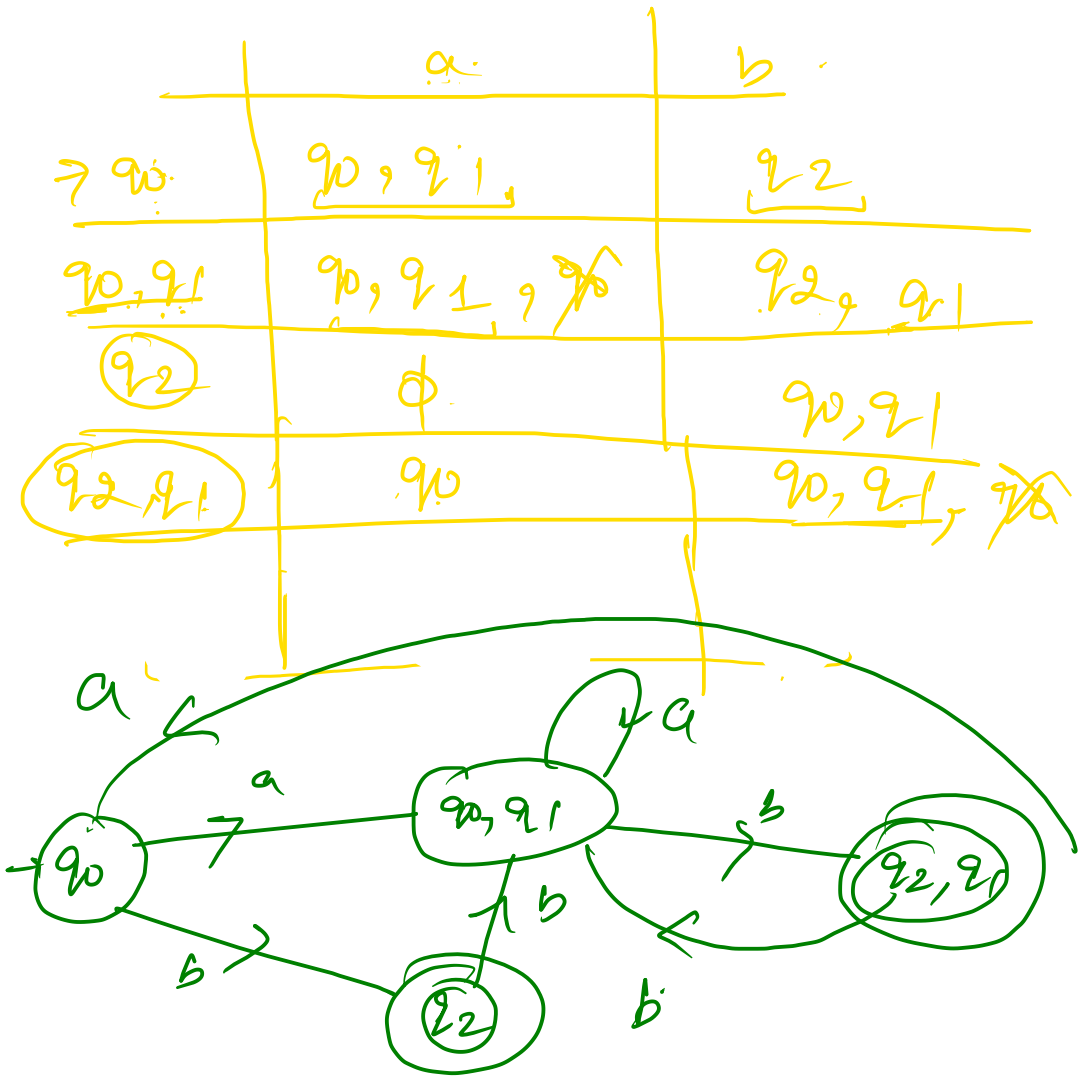
Find a deterministic acceptor equivalent to

$$M = (\{q_0, q_1, q_2\}, \{a, b\}, \delta, q_0, \{q_2\})$$

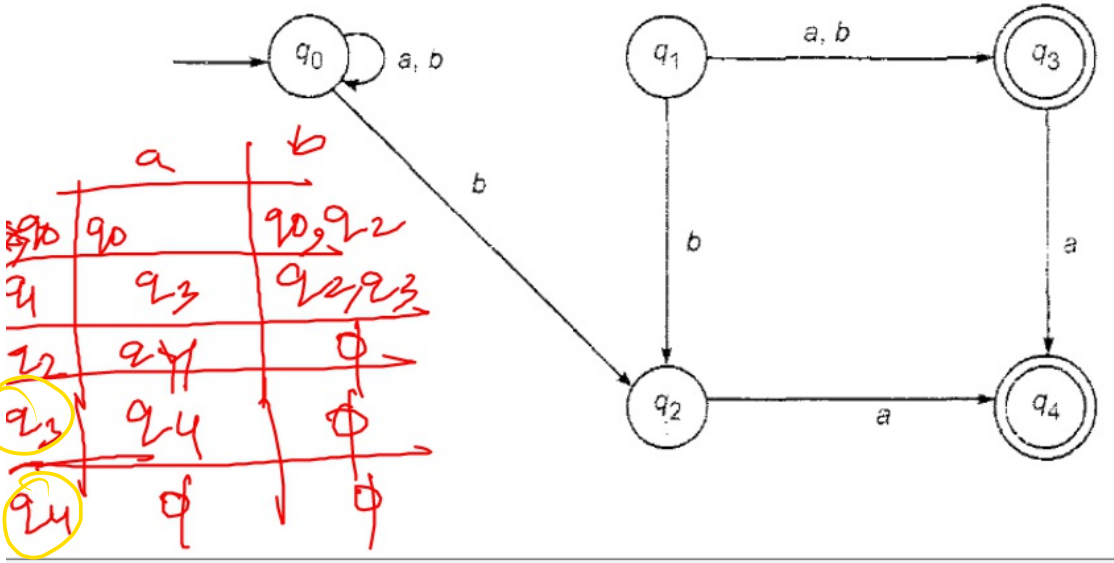
where δ is as given by Table 3.4.

TABLE 3.4 State Table for Example 3.7

State/Σ	a	b
$\rightarrow q_0$	q_0, q_1	q_2
q_1	q_0	q_1
(q_2)		q_0, q_1

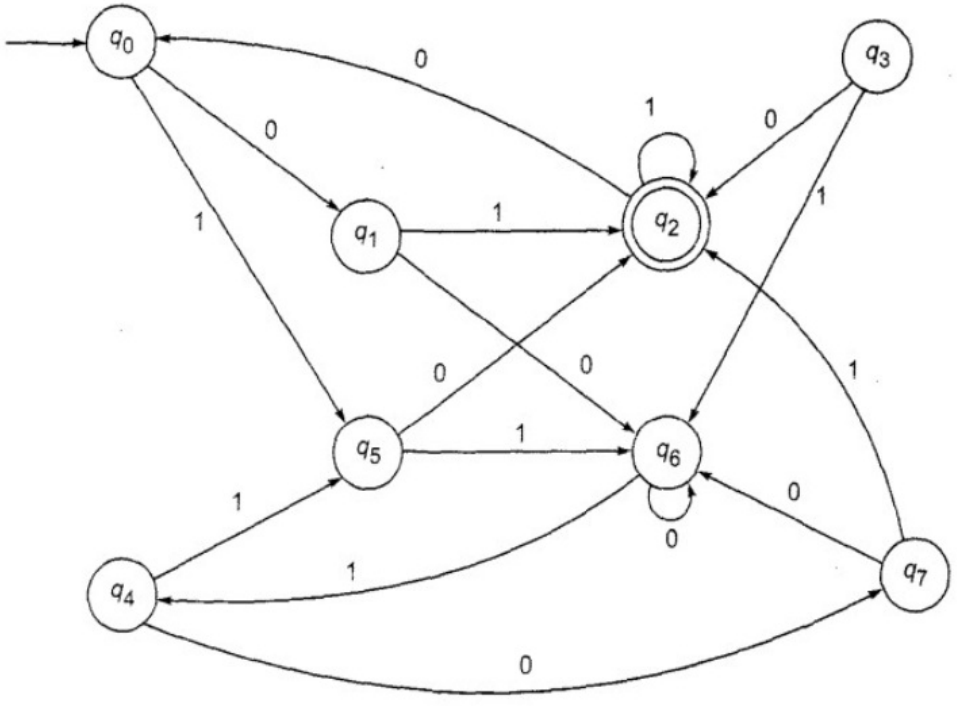


Construct a DFA equivalent to the NDFA M whose transition diagram is given



	a	b
q_0	q_0	q_0, q_2
q_3	q_2, q_3	
q_2	q_4	ϕ
q_4	q_4	ϕ
ϕ	ϕ	ϕ

	a	b
$\rightarrow q_0$	q_0	q_0, q_2
q_0, q_2	q_0, q_4	q_0, q_2
q_0, q_4	q_0	q_0, q_2



	0	1
→ q_0	q_1	q_5
q_1	q_6	q_2
q_2	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2

Note :-

a. Final & Non final States can't form a set

b. single state in a set can't be separated

Procedure

1. Separate sets of final & non final states
2. Check transition of every state as per set they belong
3. Continue the process till last two steps (sets) are same.

	0	1
→ q_0	q_1	q_5
q_1	q_6	q_2
q_2	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2

Procedure

1. Separate sets of final & non final states
2. Check transition of every state as per set they belong
3. Continue the process till last two steps (sets) are same.

$\pi_1 = \{q_0, q_1, q_3, q_5, q_6, q_7\}\{q_2\}$ (NF, A, B, E)

$\pi_2 = \{q_2\}\{q_0, q_4, q_6\}\{q_3, q_5\}\{q_1, q_7\}$ (A, B, C, D)

$\pi_3 = \{q_2\}\{q_0, q_4\}\{q_6\}\{q_3, q_5\}\{q_1, q_7\}$ (A, B, C, D, E)

$\pi_4 = \{q_2\}\{q_6\}\{q_1, q_7\}\{q_3, q_5\}\{q_0, q_4\}$

$\pi_4 = \pi_3$ →

π_2:
$q_0 = AA$ $q_7 = AB$
$q_1 = AB$
$q_3 = BA$
$q_5 = BA$
$q_6 = AA$
$q_4 = AA$

π_3:
Check
q_0, q_4, q_6
$q_0 \Rightarrow DC$ $q_6 = BB$
$q_4 = DC$
q_3, q_5
$q_3 = AB$ $q_1 = BA$
$q_5 = AB$ $q_7 = BA$
q_1, q_7

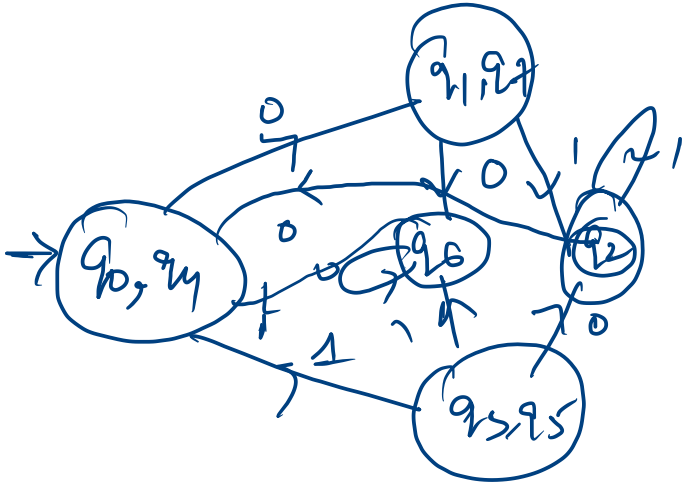
$q_0 = EA$
$q_4 = EA$

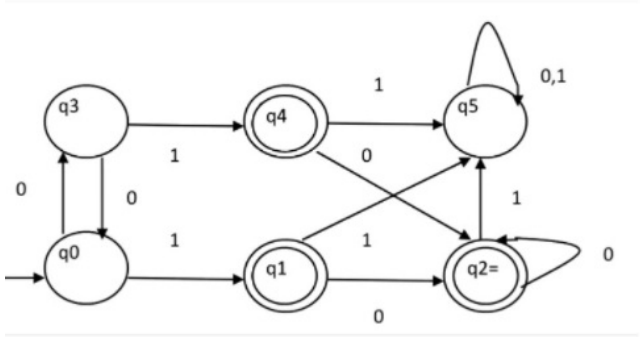
New DFA

$\Pi_4 = \{q_0, q_4\}\{q_3, q_5\}\{q_1, q_7\}\{q_2\}\{q_6\}$

	0	1
→ q_0	q_1	q_5
q_1	q_6	q_2
(q_2)	q_0	q_2
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6	q_6	q_4
q_7	q_6	q_2

	0	1
→ q_0, q_4	q_1, q_7	q_3, q_5
q_1, q_7	q_6	q_2
q_3, q_5	q_2	q_6
(q_2)	q_0, q_4	q_2
q_6	q_6	q_0, q_4





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

F

$\Pi_1 = \{q_1, q_2, q_4\}\ \{q_0, q_3, q_5\}$ (A)

$\Pi_2 = \{q_1, q_2, q_4\}\ \{q_0, q_3\}\ \{q_5\}$ (A, B, C)

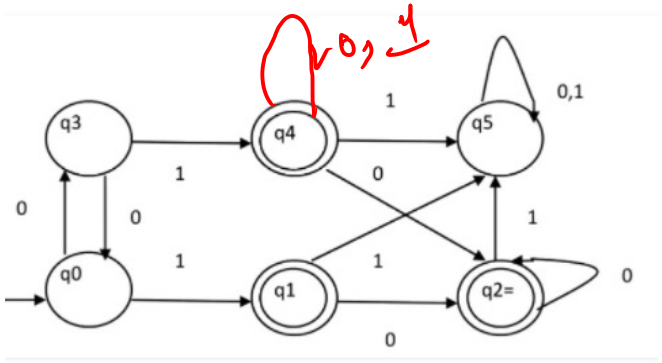
$\Pi_3 = \{q_1, q_2, q_4\}\ \{q_5\}\ \{q_0, q_3\}$

$\Pi_4 = \{q_1, q_2, q_4\}\ \{q_0, q_3\}\ \{q_5\}$ — NFF → NFNF

F

$q_0 = BA$	$q_5 = BA$
$q_3 \quad BA$	$q_3 = BA$

$q_5 \neq BB$



$\{q_1, q_2\}\{q_4\}\{q_3, q_0\}\{q_5\}$

If q_4 is final state (Transition with 0, 1)

q_4 same

$\Pi_4 = \{q_4, q_1, q_2\}\{q_0, q_3, q_5\}$

$\Pi_2 = \{q_4\}\{q_1, q_2\}\{q_0, q_3\}\{q_5\}$

$\Pi_3 =$