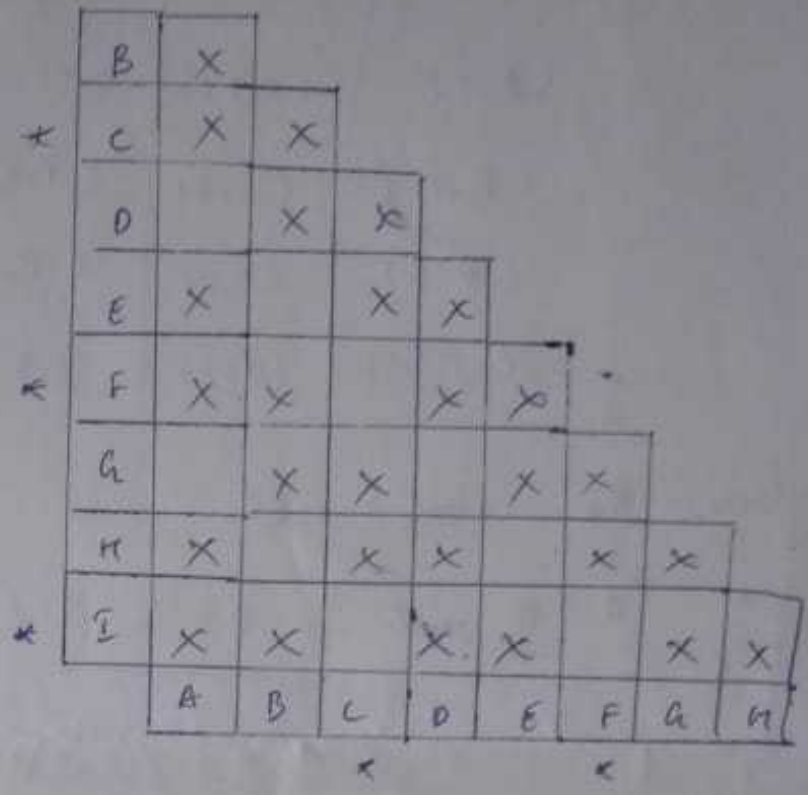
TFCS Tutorials

D) Minimise the following DFA using table filling algorithm

	δ	0	1
→	A	B	E
	B	C	F
*	C	D	H
	D	E	H
	E	F	I
*	F	G	B
	G	H	B
	H	I	C
*	I	A	E



δ	0	1
(A,B)	(B,C)	(E,F)
(A,D)	(B,E)	(E,H)
(A,E)	(B,F)	(E,I)
(A,G)	(B,H)	(E,B)
(A,H)	(B,I)	(E,C)
(B,D)	(C,E)	(F,H)
(B,E)	(C,F)	(F,I)
(B,G)	(C,H)	(F,B)
(B,H)	(C,I)	(F,C)
(D,E)	(B,F)	(H,I)
(D,G)	(E,H)	(H,B)
(D,H)	(E,I)	(H,C)
(E,G)	(F,H)	(I,B)
(E,H)	(F,I)	(I,C)
(G,H)	(H,I)	(B,C)

$\Rightarrow$

δ	0	1
(A, D)	(B, E)	(E, H)
(D, G)	(B, H)	(E, B)
(B, E)	(C, F)	(F, I)
(B, H)	(C, I)	(F, C)
(D, G)	(E, H)	(H, B)
(E, H)	(F, I)	(I, C)

From the above table

$\Rightarrow$ $A \equiv D$ & $D \equiv G$ & $A \equiv G$

$\therefore$ $A \equiv D \equiv G$

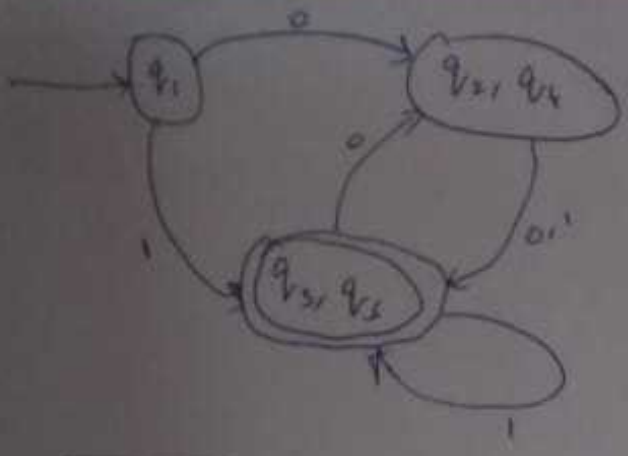
$\Rightarrow$ $B \equiv E$ & $E \equiv H$ & $B \equiv H$

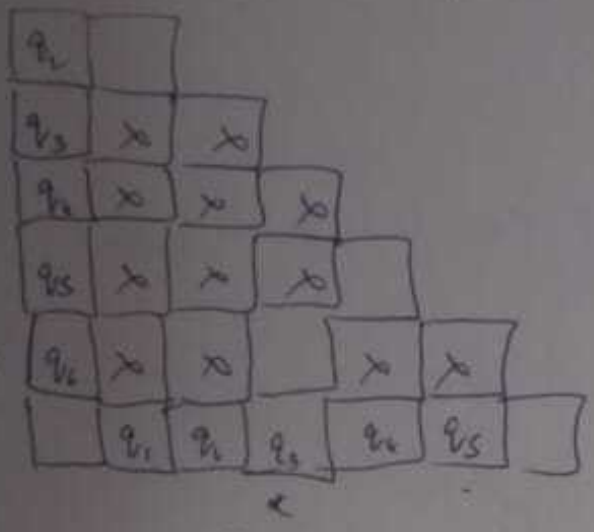
$\therefore$ $B \equiv E \equiv H$

$\Rightarrow$ $C \equiv I \equiv F$

$\Rightarrow$

δ	0	1
(A, D, G)	(B, E, H)	(B, E, H)
(B, E, H)	(C, F, I)	(C, F, H)
(C, F, I)	(A, D, G)	(E, B, H)





Now q_1 : q_2 q_6 { (NF, F)
q_2 : q_1 q_3 { (NF, F)

Now Transition table is :

δ	0	1
(q_1, q_2)	(q_1, q_2)	(q_3, q_6)
(q_3, q_4)	(q_1, q_2)	(q_4, q_5)
(q_4, q_5)	(q_4)	(q_3, q_5)

Because (q_4, q_5) is crossed → Cross (q_3, q_6) also.

Because (q_3, q_6) is crossed → Cross (q_3, q_4) also.

Hence can't reduce or minimise the given DFA.

Tutorial

Refer exercise 4.4.1 for the DFA 4.4.2.

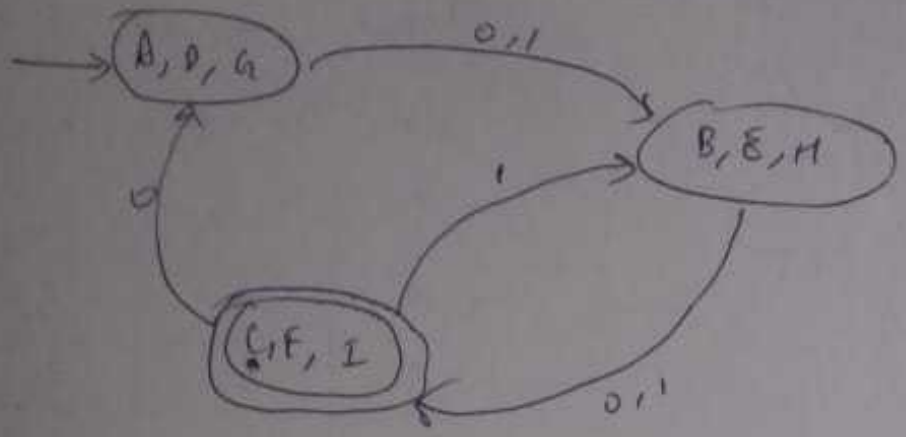
δ	0	1
→ q_1	q_2	q_6
q_2	q_1	q_3
← q_3	q_2	q_4
q_4	q_6	q_2
q_5	q_4	q_5
← q_6	q_5	q_4

Similarly (q_1, q_2) (q_3, q_6) (q_4, q_5) the order pairs should not be crossed.

And (q_1, q_4) (q_2, q_3) (q_2, q_6) (q_4, q_5) should be crossed.

(q_2, q_5) was already crossed hence (q_4, q_6) should also be crossed.

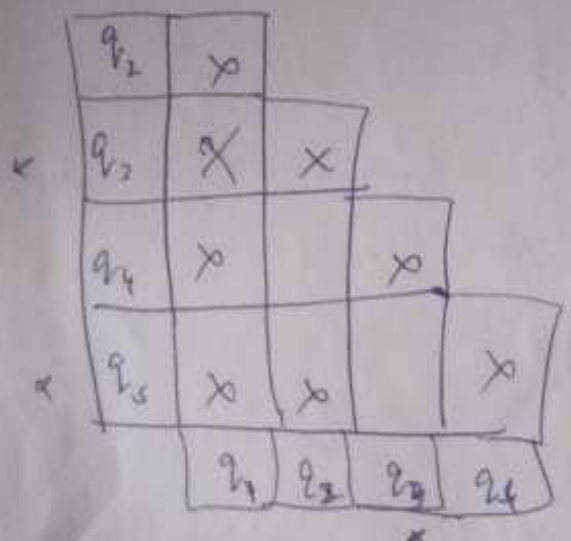
Transition diagram of minimised DFA



Q) Consider the DFA given by the transition table

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

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



Now

	0	1	
A → q_1	q_2	q_3	(NF, F)
B q_2	q_3	q_5	(F, F)

Similarly (q_1, q_4), (q_1, q_4) will also get cancelled.

Now (q_1, q_4) & (q_2, q_5) are equivalent.

Reduced state transition diagram :-