1)

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S	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

i)

	A	B	C	D	E	F	G	H
B								
*C	X	X						
D			X					
E			X					
*F	X	X		X	X			
G			X			X		
H			X			X		
*I	X	X		X	X		X	X

Cross combinations of final and non-final states

ii)

	A	B	C	D	E	F	G	H
B	X							
*C	X	X						
D		X	X					
E	X		X					
*F	X	X		X	X			
G		X	X		X	X		
H	X		X	X		X		
*I	X	X		X	X		X	X

Check 0 i/p & 1 i/p combination of A and B to start with.

Hence, remaining pairs are,

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

From the above table,

$A = D = G$

$B = E = H$

$C = I = F$

⟹

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

Transition diagram of minimized
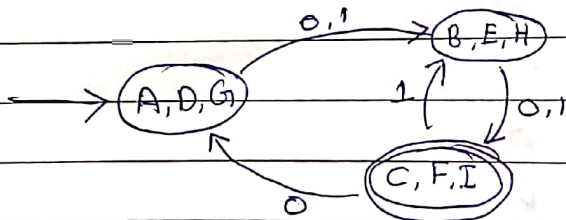
P2	δ	0	1
→	q_1	q_2	q_3
	q_2	q_3	q_5
*	q_3	q_4	q_3
	q_4	q_3	q_5
*	q_5	q_2	q_5

Soln:

step i)

	q_2			
* q_3	X	X		
q_4			X	
* q_5	X X	X		X
	q_1	q_2	q_3	

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

	q_1	q_2	q_3	q_4
q_2	X			
* q_3	X	X		
q_4	X		X	
* q_5	X	X	X	

From the above table,
(q_2,q_4) and (q_3,q_5)
form equivalents.

Reduced DFA

	δ	0	1
→	(q_2,q_4)	(q_1,q_5)	(q_5,q_3)
*	(q_3,q_5)	(q_4,q_2)	(q_3,q_5)

	δ	0	1
→	q_1	(q_2,q_4)	(q_3,q_5)
	(q_2,q_4)	(q_3,q_5)	(q_3,q_5)
*	(q_3,q_5)	(q_2,q_4)	(q_5,q_5)

P2)

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

i)

	q_1	q_2	q_3	q_4	q_5
q_2					
* q_3	X	X			
q_4			X		
q_5			X		
* q_6	X	X		X	X

Step 2:-

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

After step 2 and step 3 we can say there are no equivalent states for the given table.