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9913 TE comps A
Batch C   26/8/24

Tut 3

1.

q \ Σ	a	b
→ q_0	q_1	q_2
q_1	q_2	q_3
q_2	q_4	q_6^*
q_3	q_{54}	q_5^*
q_4	q_3	q_6^*
q_5^*	q_5^*	q_6^*
q_6^*	q_5^*	q_6^*

	q_0	q_1	q_2	q_3	q_4	q_5
q_1	×					
q_2	×	×				
q_3	×	×	=			
q_4	×	×	=	=		
q_5	×	×	×	×	×	
q_6	×	×	×	×	×	=

$(q_5, q_6) \rightarrow \delta(q_5, a) = q_5 *$ $\delta(q_5, b) = q_6 *$

$\delta(q_6, a) = q_5 *$ $\delta(q_6, b) \ q_6 *$

$(q_4, q_6) \rightarrow \delta(q_4, a) = q_3$ $\times$ 1 Final , 1 unfinal

$\delta(q_6, a) = q_5 *$

$(q_3, q_6) \rightarrow \delta(q_3, a) = q_4$ $\times$ 1 final , 1 unfinal

$\delta(q_6, a) = q_5 *$

$(q_2, q_6) \rightarrow \delta(q_2, o) = q_6 \ q_4$ $\times$ 1 final , 1 unfinal

$\delta(q_6, b) = q_5 *$

$(q_1, q_6) \rightarrow \delta(q_1, a) = q_2$ $\times$ 1 final , 1 unfinal .

$\delta(q_6, a) = q_5 *$

$(q_4, q_5) \rightarrow \delta(q_4, o) = q_3$ $\times$

$\delta(q_5, a) = q_5 *$

$(q_3, q_5) \rightarrow \delta(q_3, a) = q_4$ $\times$

$\delta(q_5, a) = q_5 *$

$(q_2, q_5) \rightarrow \delta(q_2, o) = q_4$ $\times$

$\delta(q_5, a) = q_5 *$

$(q_1, q_5) \rightarrow \delta(q_1, a) = q_2$ $\times$

$\delta(q_5, a) = q_5 *$

$(q_0, q_5) \rightarrow \delta(q_0, a) = q_1$ $\times$

$\delta(q_5, o) = q_5 *$

Q.1

$(q_3, q_4) = \delta(q_3, a) = q_4 \qquad \delta(q_3, b) = q_5^* \quad \checkmark$
$\qquad\qquad \delta(q_4, a) = q_3 \qquad \delta(q_4, b) = q_6^{\leftarrow}$

$(q_2, q_4) = \delta(q_2, a) = q_4 \qquad \delta(q_2, b) = q_6^* \quad \checkmark$
$\qquad\qquad \delta(q_4, a) \quad q_3 \qquad \delta(q_4, b) = q_6^*$

$(q_1, q_4) = \delta(q_1, a) = q_2 \qquad \delta(q_1, b) = q_3$
$\qquad\qquad \delta(q_4, a) = q_3 \qquad \delta(q_4, b) = q_6^* \quad \times$

$(q_0, q_4) = \delta(q_0, a) = q_1 \qquad \delta(q_0, b) = q_2^* \quad \times$
$\qquad\qquad \delta(q_4, a) = q_3 \qquad \delta(q_4, b) = q_6^*$

$(q_2, q_3) = \delta(q_2, a) = q_4 \quad \times \qquad \delta(q_2, b) = q_6^* \quad \checkmark$
$\qquad\qquad \delta(q_3, a) = q_4 \qquad \delta(q_3, b) \quad q_5^*$

$(q_1, q_3) = \delta(q_2, a) = q_4 \qquad \delta(q_2, b) = q_3^* \quad \times$
$\qquad\qquad \delta(q_3, a) = q_4 \qquad \delta(q_3, b) = q_5^*$

$(q_0, q_3) = \delta(q_0, a) = q_1 \qquad \delta(q_0, b) = q_2 \quad \times$
$\qquad\qquad \delta(q_3, a) = q_4 \qquad \delta(q_3, b) = q_5^*$

$\delta(q_1, q_2) = \delta(q_1, a) = q_2 \qquad \delta(q_1, b) = q_3$
$\qquad\qquad \delta(q_2, a) = q_4 \qquad \delta(q_2, b) = q_6^*$

$\delta(q_0, q_2) = \delta(q_0, a) = q_1 \qquad \delta(q_0, b) = q_2$
$\qquad\qquad \delta(q_2, a) = q_4 \qquad \delta(q_2, b) = q_6^*$

$(q_0, q_1) = \delta(q_0, a) = q_1 \qquad \delta(q_0, b) = q_2$
$\qquad\qquad \delta(q_1, a) = q_2 \qquad \delta(q_1, b) = q_3$
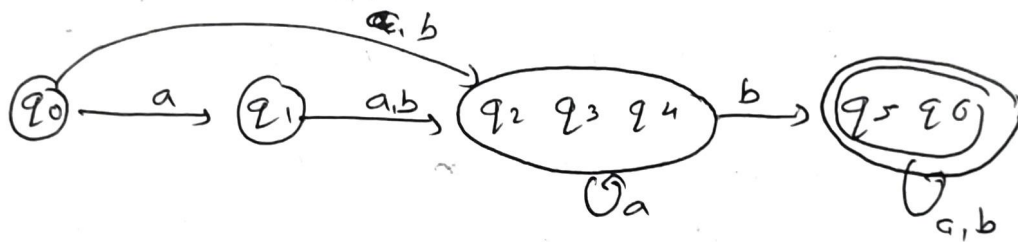
0.1   But while checking for equivalence,

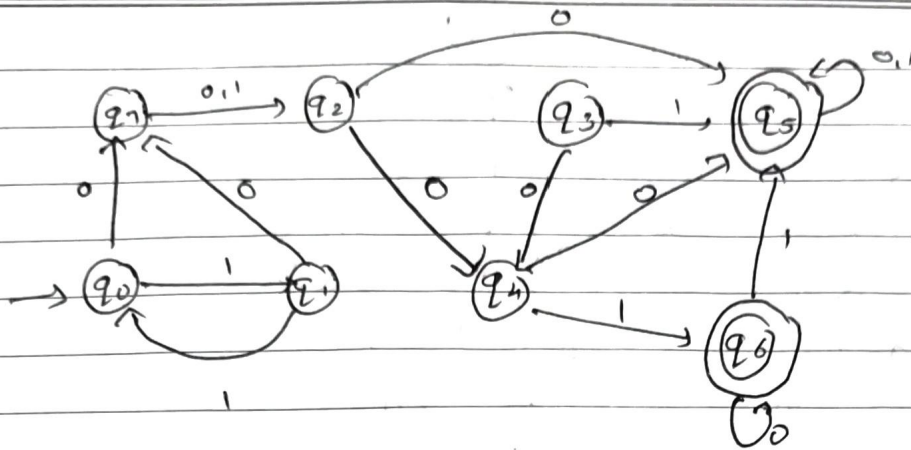$$(q_0, q_1) \rightarrow \delta(q_0, a) = q_1$$
$$\delta(q_1, a) = q_2$$
(a_1, q_2) is   marked
$\therefore (q_0, q_1)$ will also be marked.
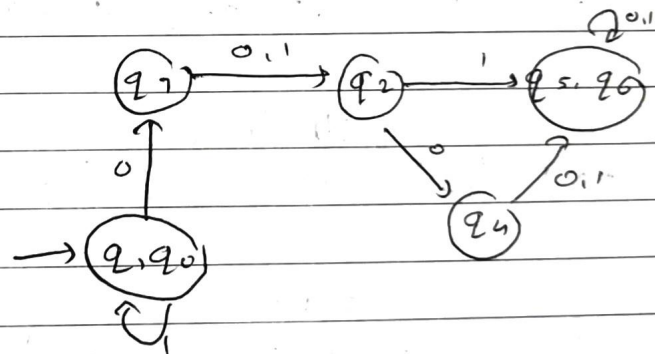
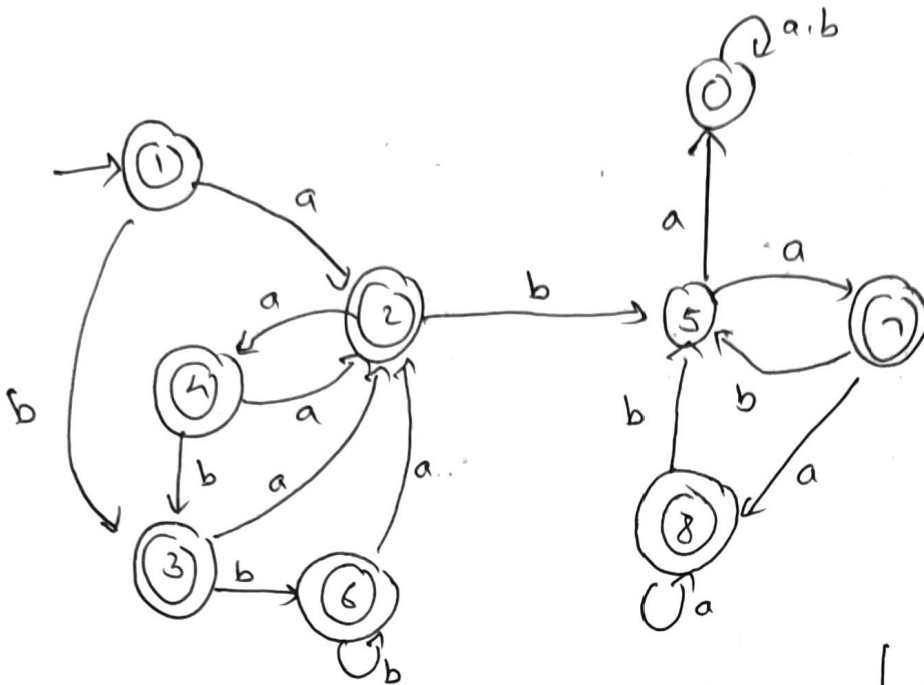(q_2, q_3, q_4) , (q_5, q_6), q_0, q_1

2.

	0	1
q_0	q_7	q_1
q_1	q_2	q_0
q_2	q_4	q_5 *
q_7		
q_4	q_5 *	q_6 *
q_5 *	q_5 *	q_5 *
q_6 *	q_6 *	q_5 *

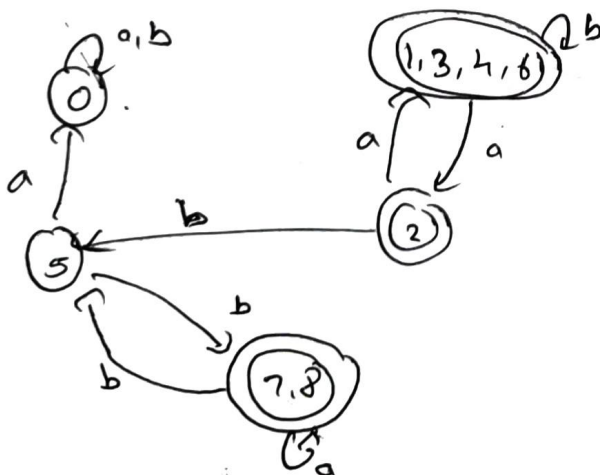|						
q_1	=					
q_2	✓	✓				
q_4	✓	✓	✓			
q_5	✓	✓	✓	✓		
q_6	✓	✓	✓	✓	=	
q_7	✓	✓	✓	✓	✓	✓
	q_0	q_1	q_2	q_4	q_5	q_6

Q.3

0 - equivalence
{0, 5}   {1, 2, 3, 4, 6, 7, 8}

1 - equivalence
{0} {5} {1, 3, 4, 6} {2, 7, 8}

2 - equivalence
{0} {5} {1, 3, 4, 6} {2} {7, 8}

3 - equivalence
{0} {5} {1, 3, 4, 6} {2} {7, 8}

	a	b
0	0	0
1 *	2	3
2 *	4	5
3 *	2	6
4 *	2	3
5	0	7
6 *	2	6
7 *	8	5
8 *	8	5

Q.4

	a	b
→ q_0	q_1	q_5
q_1	q_6	q_2
q_2^*	q_0	q_6
q_3	q_2	q_6
q_4	q_7	q_5
q_5	q_2	q_6
q_6^*	q_3	q_4
q_7	q_6	q_2
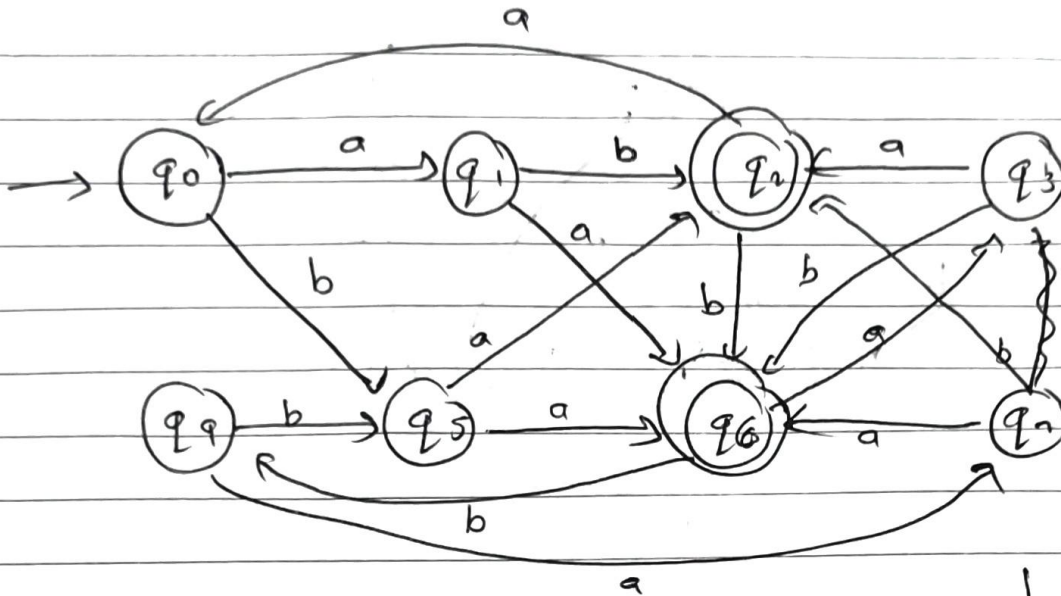
0- equivalence

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

1- equivalence

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

2- equivalence

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

3- equivalence

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

	a	b
$\{q_0, q_4\}$	$\{q_1, q_7\}$	$\{q_3, q_5\}$
$\{q_1, q_7\}$	$\{q_6\}$	$\{q_2\}$
$\{q_3, q_5\}$	$\{q_2\}$	$\{q_6\}$
$\{q_2\}^*$	$\{q_0, q_4\}$	$\{q_6\}$
$\{q_6\}^*$	$\{q_3, q_5\}$	$\{q_0, q_4\}$