

# TOA

23K-2001

Date: 05/03/2025

## Activity 01

BCS-4J

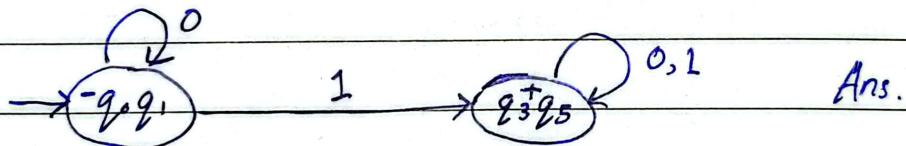
Q1: Find the minimal DFA:

	0	1	
$q_0$	$q_1$	$q_3$	
$q_1$	$q_0$	$q_3$	
$q_2$	$q_1$	$q_4$	
+ $q_3$	$q_5$	$q_5$	
$q_4$	$q_3$	$q_3$	
+ $q_5$	$q_5$	$q_5$	

$$\pi_0 = \{q_0, q_1\} \quad \{q_3, q_5\}$$

$$\pi_1 = \{q_0, q_1\} \quad \{q_3, q_5\}$$

minimal DFA:



Ans.

Q2: Find the minimal DFA:

	a	b	
1	2	3	
2	5	4	
3	4	9	
+ 4	6	8	
5	2	6	
6	4	7	
7	8	6	
8	7	4	
9	8	3	

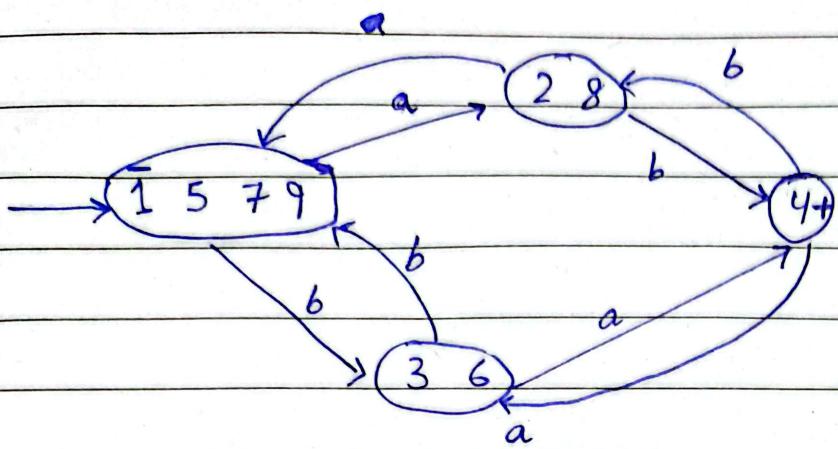
$$\pi_0 = \{1, 2, 3, 5, 6, 7, 8, 9\} \quad \{4\}$$

$$\pi_1 = \{1, 5, 7, 9\} \quad \{2, 3, 6, 8\} \quad \{4\}$$

$$\pi_2 = \{1, 5, 7, 9\} \quad \{2, 8\} \quad \{3, 6\} \quad \{4\}$$

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minimal DFA:



Q3:

FA:01

⇒ Given NFA

S <sub>NFA</sub>	a	b	
q <sub>0</sub>	{q <sub>0</sub> , q <sub>2</sub> }	q <sub>1</sub>	
+ q <sub>1</sub>	{q <sub>0</sub> , q <sub>4</sub> }	q <sub>1</sub>	
q <sub>2</sub>	q <sub>3</sub>	q <sub>1</sub>	
+ q <sub>3</sub>	q <sub>2</sub>	q <sub>4</sub>	
q <sub>4</sub>	q <sub>1</sub>	q <sub>3</sub>	

⇒ Convert to DFA

S <sub>DFA</sub>	a	b	
q <sub>0</sub>	q <sub>0</sub> q <sub>2</sub>	q <sub>1</sub>	
q <sub>0</sub> q <sub>2</sub>	q <sub>0</sub> q <sub>2</sub> q <sub>3</sub>	q <sub>1</sub>	
+ q <sub>1</sub>	q <sub>0</sub> q <sub>4</sub>	q <sub>1</sub>	
+ q <sub>0</sub> q <sub>2</sub> q <sub>3</sub>	q <sub>0</sub> q <sub>2</sub> q <sub>3</sub>	q <sub>1</sub> q <sub>4</sub>	
q <sub>0</sub> q <sub>4</sub>	q <sub>0</sub> q <sub>1</sub> q <sub>2</sub>	q <sub>1</sub> q <sub>2</sub>	
+ q <sub>0</sub> q <sub>1</sub> q <sub>2</sub>	q <sub>0</sub> q <sub>2</sub> q <sub>3</sub> q <sub>4</sub>	q <sub>1</sub>	
+ q <sub>1</sub> q <sub>3</sub>	q <sub>0</sub> q <sub>2</sub> q <sub>4</sub>	q <sub>1</sub> q <sub>3</sub>	
+ q <sub>1</sub> q <sub>4</sub>	q <sub>0</sub> q <sub>1</sub> q <sub>4</sub>	q <sub>1</sub> q <sub>3</sub>	
+ q <sub>0</sub> q <sub>1</sub> q <sub>4</sub>	q <sub>0</sub> q <sub>1</sub> q <sub>2</sub> q <sub>4</sub>	q <sub>1</sub> q <sub>3</sub>	

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$+ 90919294$	$9091929384$	$9193$	
$+ 90929394$	$90919293$	$919394$	
$909294$	$90919293$	$9193$	
$+ 90919293$	$90929384$	$919384$	
$+ 9091929384$	$9091929384$	$919394$	
$+ 919394$	$90919294$	$919394$	

$$\pi_0 = \{g_0, g_1g_3, g_0g_4, g_0g_2, g_4\} \{g_1, g_0g_2g_3, g_0g_1g_2, g_1g_3, g_1g_4, g_0g_1g_4, g_0g_1g_2g_4, g_0g_1g_3g_4, g_0g_1g_2g_3\}$$

$$\pi_1 = \{q_0\} \{q_1 q_3 \quad q_0 q_1 \quad q_0 q_2 q_4\} \{q_1\} \{q_1 q_3\} \{q_0 q_2 q_3 \quad q_0 q_2 q_3 q_4 \quad q_0 q_1 q_2 q_3 \\ q_0 q_1 q_2 q_3 q_4 \quad q_1 q_3 q_4\} \\ \{q_0 q_1 q_2 \quad q_1 q_4 \quad q_0 q_1 q_4 \quad q_0 q_1 q_2 q_4\}$$

$$\pi_2 = \{q_0\} \{q_1\} \{q_2, q_3\} \{q_0, q_2\} \{q_0, q_4\} \{q_0, q_2, q_4\} \{q_0, q_2, q_3\} \\ \{q_0, q_2, q_3, q_4\} \{q_0, q_1, q_2, q_3, q_4\} \{q_0, q_1, q_2, q_3\} \{q_1, q_3, q_4\} \{q_1, q_4\} \{q_0, q_1, q_4\}$$

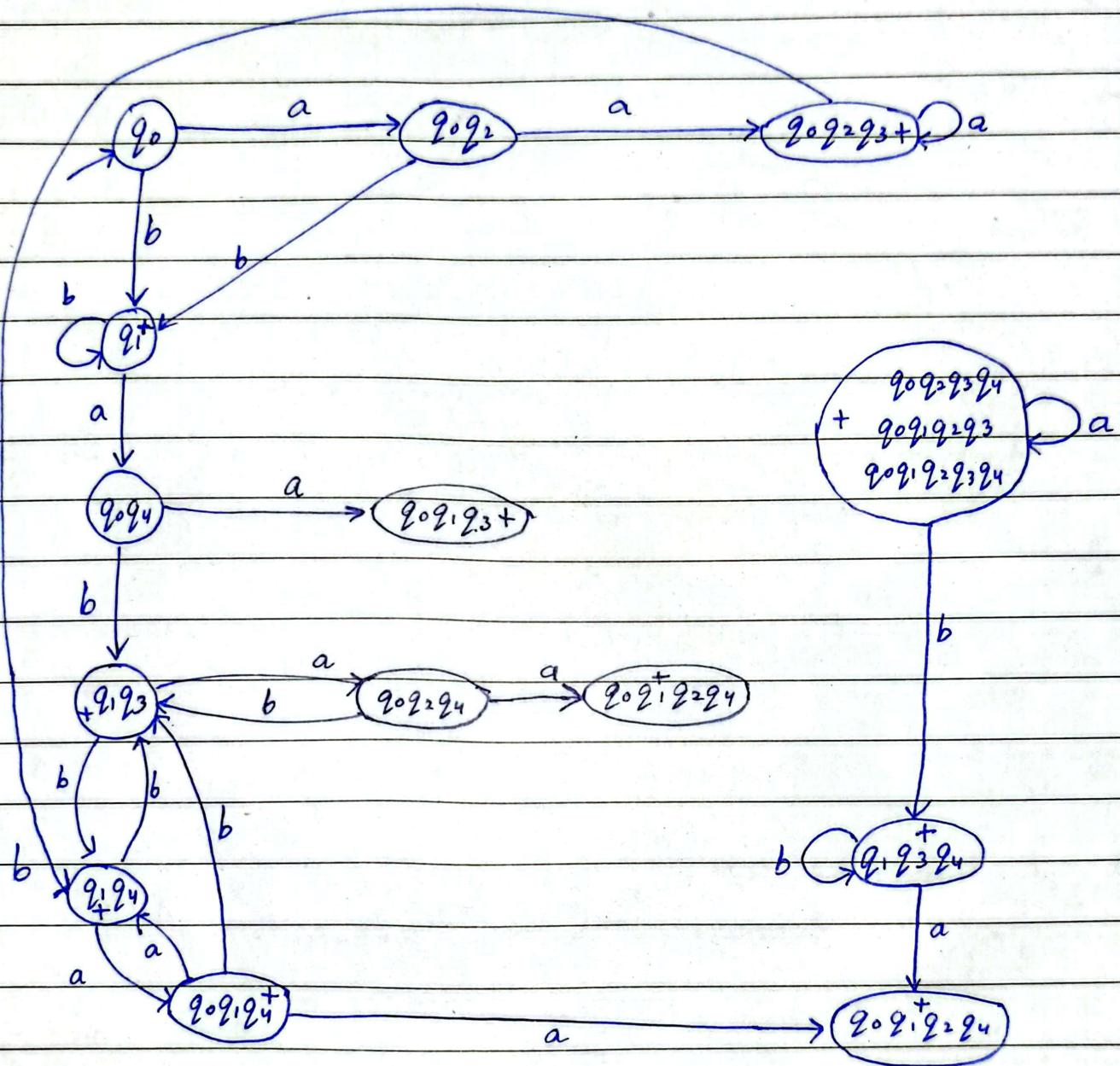
$$\mathcal{L}_3 = \{g_0\} \{g_1\} \{g_1 g_3\} \{g_0 g_2\} \{g_0 g_4\} \{g_0 g_2 g_4\} \{g_0 g_2 g_3\} \\ \{g_0 g_2 g_3 g_4\} \{g_0 g_1 g_2 g_3\} \{g_0 g_1 g_2 g_4\} \{g_0 g_1 g_3 g_4\} \{g_1 g_2 g_3\} \{g_1 g_2 g_4\}$$

we can proceed with the minimized DFA as  $\pi_3 \Rightarrow$

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Minimized DFA of FA<sub>01</sub> ⇒



Ans.

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Date: \_\_\_\_\_

Q3 :FA : 02

SDFAs	a	b	
$q_0$	$q_2$	$q_1$	
+	$q_1$	$q_5$	$q_0$
$q_2$	$q_0$	$q_1$	
$q_3$	$q_2$	$q_5$	
+	$q_4$	$q_5$	$q_3$
$q_5$	$q_2$	$q_4$	

$$\pi_0 = \{q_0 q_2 q_3 q_5\} \{q_1, q_4\}$$

$$\pi_1 = \{q_0, q_2, q_5\} \{q_3\} \{q_1, q_4\}$$

$$\pi_2 = \{q_0, q_2, q_5\} \{q_3\} \{q_1\} \{q_4\}$$

$$\pi_3 = \{q_0, q_2\} \{q_5\} \{q_3\} \{q_1\} \{q_4\}$$

Minimized DFA of FA: 02  $\Rightarrow$ 