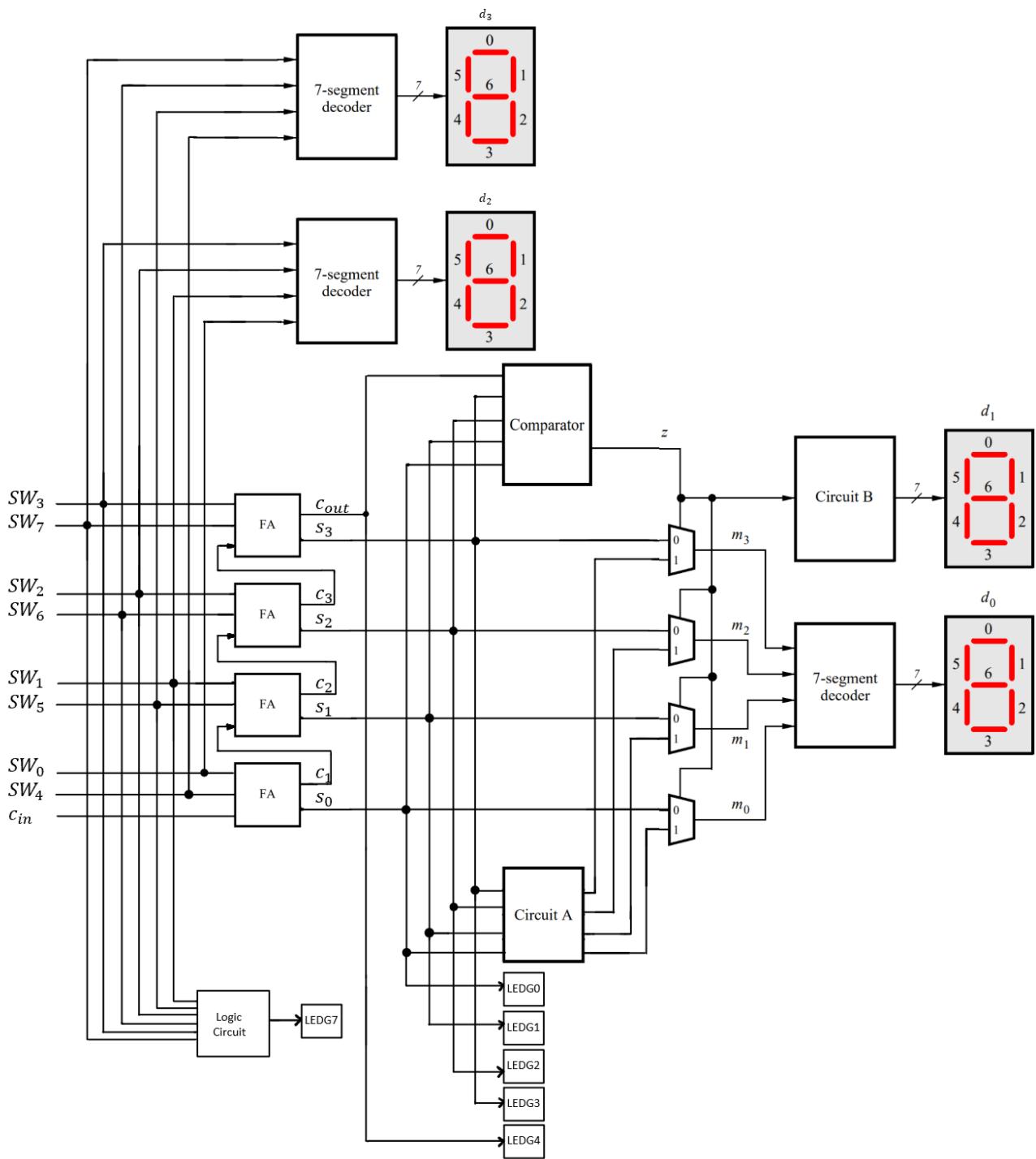


- circuit diagram



Truth table for circuit A						K-map and logic expressions	
Decimal	S3	S2	S1	S0	A0		
	0	1	x	x	d		
	1	0	0	x	d		
10	1	0	1	0	0		
11	1	0	1	1	1		
12	1	1	0	0	0		
13	1	1	0	1	1		
14	1	1	1	0	0		
15	1	1	1	1	1		
16	0	0	0	0	0		
17	0	0	0	1	1		
18	0	0	1	0	0		
19	0	0	1	1	1		

		S_0S_1			
		\swarrow			
S_2S_3		00	01	11	10
00		0	0	1	1
01		d	0	1	d
11		0	0	1	1
10		d	d	d	d

$A_0 = S_0$

Decimal	S3	S2	S1	S0	A1		
	0	1	x	x	d		
	1	0	0	x	d		
10	1	0	1	0	0		
11	1	0	1	1	0		
12	1	1	0	0	1		
13	1	1	0	1	1		
14	1	1	1	0	0		
15	1	1	1	1	0		
16	0	0	0	0	1		
17	0	0	0	1	1		
18	0	0	1	0	0		
19	0	0	1	1	0		

		S_0S_1			
		\swarrow			
S_2S_3		00	01	11	10
00		1	0	0	1
01		d	0	0	d
11		1	0	0	1
10		d	d	d	d

$A_1 = \overline{S_1}$

Decimal	S3	S2	S1	S0	A2
	0	1	x	x	d
	1	0	0	x	d
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	0
13	1	1	0	1	0
14	1	1	1	0	1
15	1	1	1	1	1
16	0	0	0	0	1
17	0	0	0	1	1
18	0	0	1	0	0
19	0	0	1	1	0

		S_0S_1			
S_2S_3	00	1	0	0	1
	01	d	0	0	d
	11	0	1	1	0
	10	d	d	d	d

$$A_2 = \bar{S}_1 \bar{S}_2 + S_1 S_2$$

Decimal	S3	S2	S1	S0	A3
	0	1	x	x	d
	1	0	0	x	d
10	1	0	1	0	0
11	1	0	1	1	0
12	1	1	0	0	0
13	1	1	0	1	0
14	1	1	1	0	0
15	1	1	1	1	0
16	0	0	0	0	0
17	0	0	0	1	0
18	0	0	1	0	1
19	0	0	1	1	1

		S_0S_1			
S_2S_3	00	0	1	1	0
	01	d	0	0	d
	11	0	0	0	0
	10	d	d	d	d

$$A_3 = S_1 \bar{S}_3$$

- logic expression for LEDG7

let $LEDG7 \leq f(a) + f(b)$

truth table and K-map for $f(a)$

a3	a2	a1	a0	f(a)
0	x	x	x	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1

$a_2 a_1$

$a_3 a_0$

	00	01	11	10
00				
01		1	1	
11	1	1	1	1
10				

$$f(a) = a_1 \cdot a_3 + a_2 \cdot a_3$$

$$\text{Similarly, } f(b) = b_1 \cdot b_3 + b_2 \cdot b_3$$

$$\text{Hence, } LEDG7 = a_1 \cdot a_3 + a_2 \cdot a_3 + b_1 \cdot b_3 + b_2 \cdot b_3$$