

Digital Electronics

Answer Sheet 5

1. Adjacent cells differ in only one variable.

2.

C\AB	00	01	11	10
0	1	0	1	1
1	0	0	1	1

POS

3.

SOP

CD\AB	00	01	11	10
00	1	0	0	1
01	1	1	0	0
11	0	1	1	0
10	X	0	1	X

$$f = \overline{B}\overline{D} + \overline{A}\overline{C}D + BCD + AC\overline{D}$$

POS

CD\AB	00	01	11	10
00	1	0	0	1
01	1	1	0	0
11	0	1	1	0
10	X	0	1	X

$$f = (B + \overline{C})(A + \overline{C} + D)(\overline{B} + C + D)(\overline{A} + C + \overline{D})$$

Both are minimal; 5 gates each.

4.

AB \ CD	00	01	11	10
00			1	
01	1	1	1	
11	1	1	1	1
10	1	1	1	1

(a) $X = A + \overline{B}\overline{C} + CD$

AB \ CD	00	01	11	10
00	1	1		
01				
11			1	1
10				

(b) $X = \overline{A}\overline{B}\overline{C} + ABC$

AB \ CD	00	01	11	10
00				
01	1	1		
11	1	1		
10	0	1		

(c) $X = \overline{B}\overline{C} + A\overline{C}D$

AB \ CD	00	01	11	10
00			1	1
01				
11				
10			1	1

(d) $X = \overline{B}\overline{C}$

AB \ CD	00	01	11	10
00	1	1	1	1
01	1			1
11	1			1
10	1	1	1	1

(e) $X = \overline{B} + \overline{D}$

FIGURE 4-14

5.

		FULL, EMPTY			
		00	01	11	10
HOT					
	00	0	0	X	0
WASH,	01	0	0	X	0
THERM	11	0	0	X	0
	10	1	1	X	0

		FULL, EMPTY			
		00	01	11	10
COLD					
	00	0	0	X	0
WASH,	01	0	0	X	0
THERM	11	1	1	X	0
	10	0	0	X	0

		FULL, EMPTY			
		00	01	11	10
MOTOR					
	00	0	0	X	0
WASH,	01	0	0	X	0
THERM	11	0	0	X	1
	10	0	0	X	1

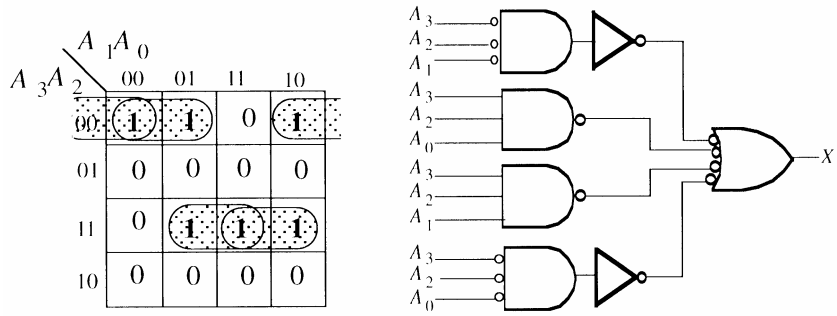
		FULL, EMPTY			
		00	01	11	10
PUMP					
	00	1	0	X	1
WASH,	01	1	0	X	1
THERM	11	0	0	X	0
	10	1	1	X	0

HOT = WASH.THERM.FULL
 MOTOR = WASH.FULL

COLD = WASH.THERM.FULL
 PUMP = WASH.EMPTY

6.

A ₃	A ₂	A ₁	A ₀	X
0	0	0	0	1
0	0	0	1	1
0	0	1	0	1
0	0	1	1	0
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	1
1	1	1	0	1
1	1	1	1	1



$$X = \bar{A}_3\bar{A}_2\bar{A}_1 + A_3A_2A_0 + A_3A_2A_1 + \bar{A}_3\bar{A}_2\bar{A}_0$$