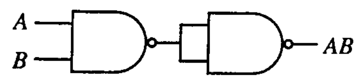
Appendix A
Digital Logic

A.1

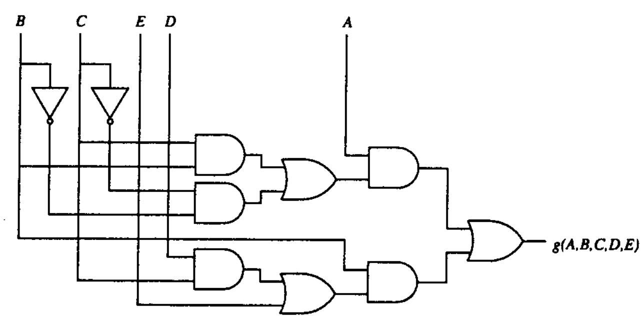


A.3

A	*B*	*C*	*F*	*G*
0	0	0	0	1
0	0	1	1	0
0	1	0	0	1
0	1	1	1	0
1	0	0	0	0
1	0	1	1	0
1	1	0	1	1
1	1	1	1	0

A.5 18.

A.7

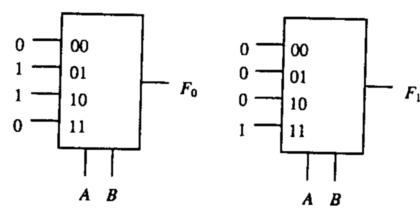


A.9

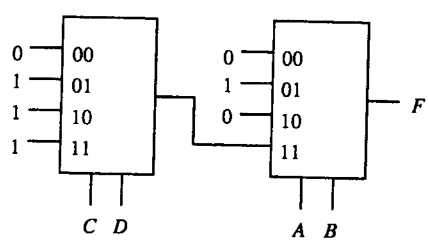
A	B	C	F
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0

$$F(A,B,C) = \bar{A}\bar{B}C$$

A.11

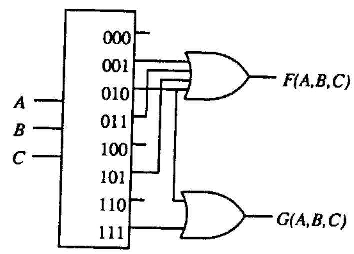


A.13

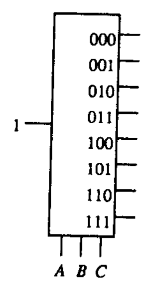


$$F(A,B,C,D) = AB(CD + \bar{C}D + C\bar{D}) + \bar{A}B$$

A.15

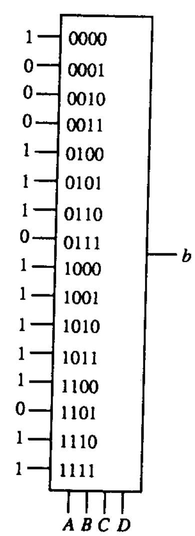


A.17



A.19

A	B	C	D	b
0	0	0	0	1
0	0	0	1	0
0	0	1	0	0
0	0	1	1	0
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	0
1	0	0	0	1
1	0	0	1	1
1	0	1	0	1
1	0	1	1	1
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

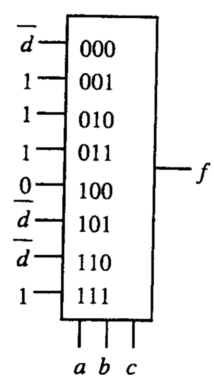


A.21

A	B	C	D	X	Y
0	0	0	0	d	d
0	0	0	1	0	0
0	0	1	0	0	1
0	0	1	1	d	d
0	1	0	0	1	0
0	1	0	1	d	d
0	1	1	0	d	d
0	1	1	1	d	d
1	0	0	0	1	1
1	0	0	1	d	d
1	0	1	0	d	d
1	0	1	1	d	d
1	1	0	0	d	d
1	1	0	1	d	d
1	1	1	0	d	d
1	1	1	1	d	d

A.23

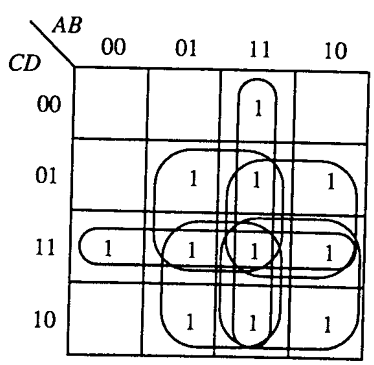
a	b	c	d	f
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	1
0	1	0	0	1
0	1	0	1	1
0	1	1	0	1
0	1	1	1	1
1	0	0	0	0
1	0	0	1	0
1	0	1	0	1
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1



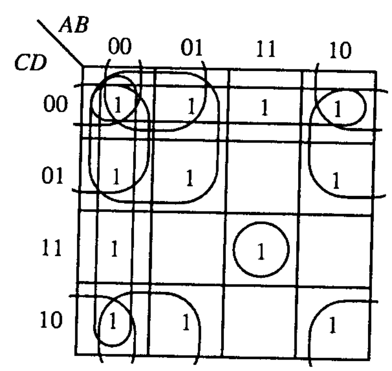
A.25

a	b	c	$ab + \bar{a}c + bc$	$ab + \bar{a}c$
0	0	0	0	0
0	0	1	1	1
0	1	0	0	0
0	1	1	1	1
1	0	0	0	0
1	0	1	0	0
1	1	0	1	1
1	1	1	1	1

A.27



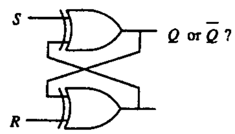
$f(A,B,C,D) = AB + CD + BD + AD + BC + AC$



$g(A,B,C,D) = ABCD + \bar{B}\bar{D} + \bar{C}\bar{D} + \bar{A}\bar{B} + \bar{A}\bar{D} + \bar{A}\bar{C} + B\bar{C}$

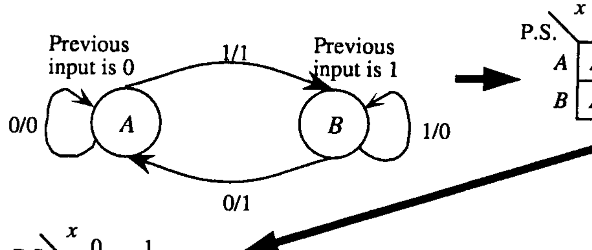
A.29 No. The don't cares are used during the design process. Once the design is fixed, the don't cares assume values of either 0s or 1s.

A.31



No, an S-R flip-flop cannot be constructed this way. There is no way to force an output high or low based only on S and R. While the combination of 11 on the inputs provides a quiescent state, the result of applying 00 is undefined and 10 and 01 are unstable.

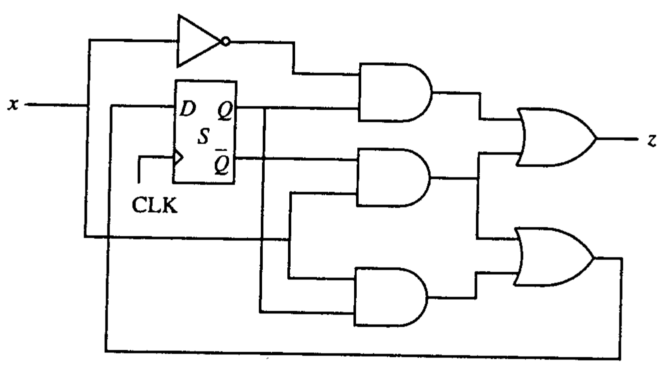
A.33



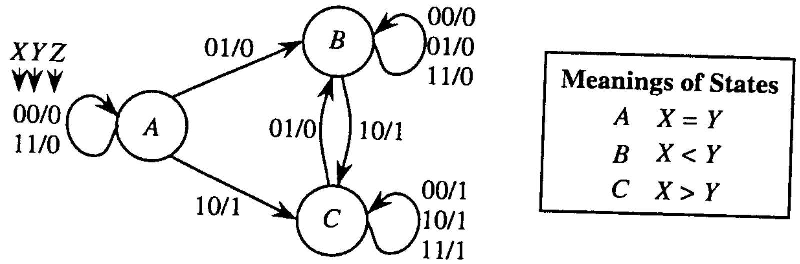
P.S. \ x	0	1
A	A/0	B/1
B	A/1	B/0

P.S. \ x	0	1
A:0	0/0	1/1
B:1	0/1	1/0

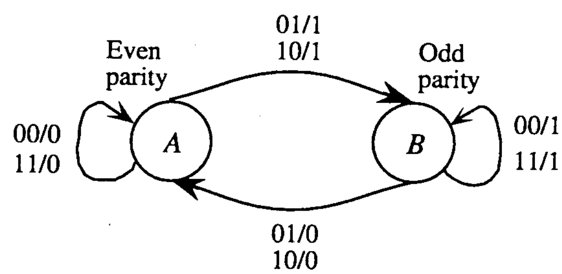
$$z = x\bar{s}_t + \bar{x}s_t$$
$$s_{t+1} = \bar{x}\bar{s}_t + xs_t$$



A.35



A.37



A.39 There are a number of solutions. Here is one: