Solutions to Problem Set of chapter 5

2.

(b) $X = \overline{\overline{A}B + \overline{A}CD + DB\overline{D}}$

4.

(d) $X = \overline{\overline{(\overline{A}+B)(\overline{BC})} + D} = (\overline{A}+B)(\overline{BC}) + D = \overline{A} + B + BC + D = \overline{A} + B + D$

(e) $X = \overline{\overline{(\overline{AB} + \overline{C})D} + \overline{E}} = (AB + \overline{C})D + \overline{E} = ABD + \overline{C}D + \overline{E}$

8. Let G = guard, S = switch, M = motor temp, and P = power. See Figure 5-3.

$P = \overline{\overline{G}S + MS}$

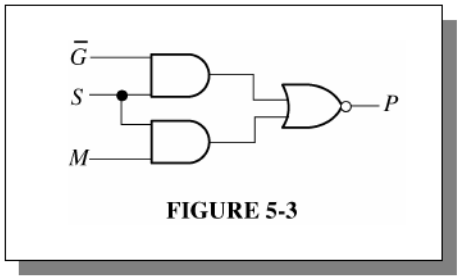
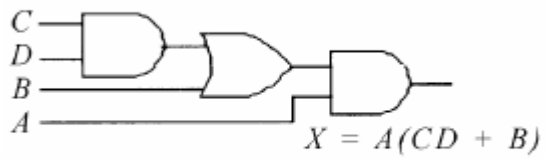


FIGURE 5-3

10.



(g)

16. $X = \overline{\overline{(AB)}\overline{(B+C)}}+C = \overline{\overline{(AB)}\overline{(B+C)}}\,\overline{C} = (\overline{AB})(\overline{B+C})\overline{C} = (\overline{A}+\overline{B})(\overline{B}\,\overline{C})\overline{C}$

$= (\overline{A}\overline{B}\overline{C}+\overline{B}\,\overline{C})\overline{C} = \overline{A}\overline{B}\overline{C}+\overline{B}\,\overline{C} = \overline{B}\,\overline{C}(A+1) = \boldsymbol{\overline{B}\,\overline{C}}$

See Figure 5-10.

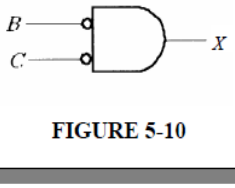


FIGURE 5-10

The output is dependent only on B and C. The value of A does not matter. The NOR gate behaves as a negative-AND.

A	B	C	X
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	0

20. See Figure 5-20.

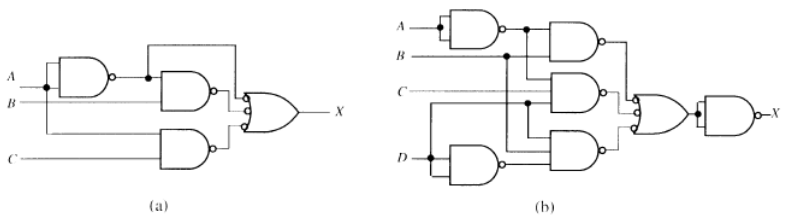


FIGURE 5-20

22. See Figure 5-22.

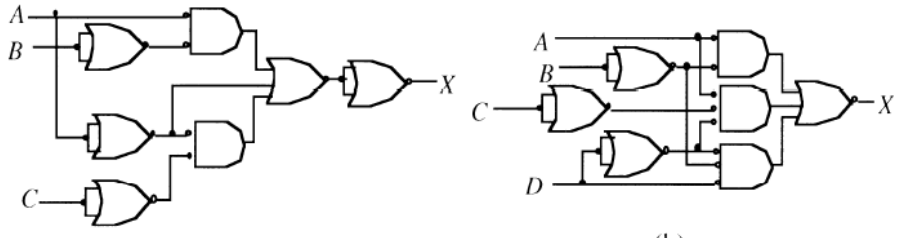


FIGURE 5-22

26.

(g) $X = A(CD + B) = \boldsymbol{ACD + AB}$

See Figure 5-44.

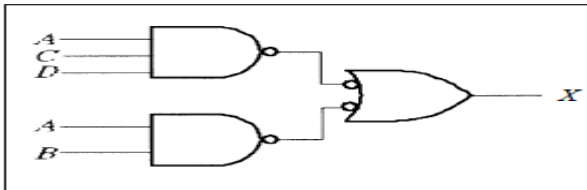


FIGURE 5-44

28. $X = \overline{\overline{A} + \overline{B} + B} = AB\overline{B} = 0$

The output X is always LOW.