# *Chapter 7*

**1.** See Figure 7-1.

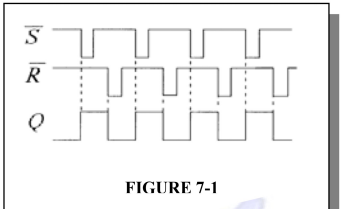



**FIGURE 7-1**

**4.** See Figure 7-4.

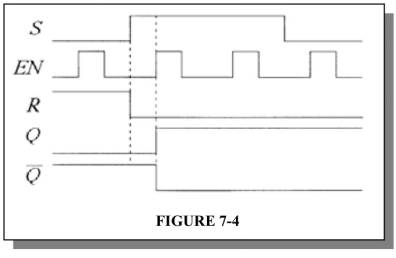
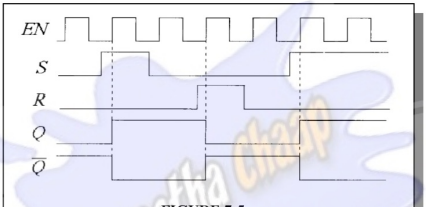



**FIGURE 7-4**

**5.** See Figure 7-5.




**7.** See Figure 7-7.

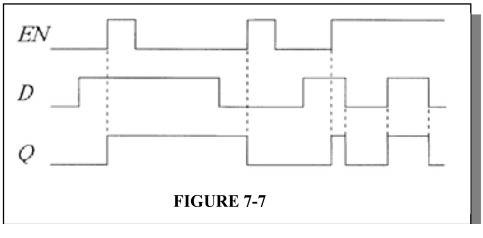



**FIGURE 7-7**

**8.** See Figure 7-8.

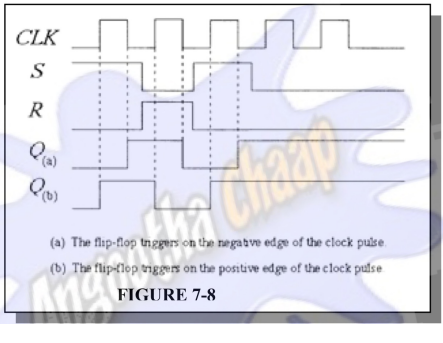



**FIGURE 7-8**

**10.** See Figure 7-10.

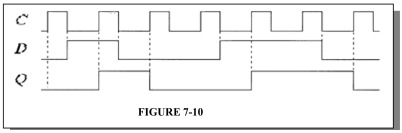



FIGURE 7-10

**14.** See Figure 7-14.

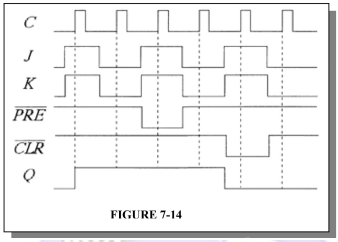



FIGURE 7-14

**16.** *J*: 0010000
*K*: 0000100
*Q*: 0011000

**17.** See Figure 7-16.

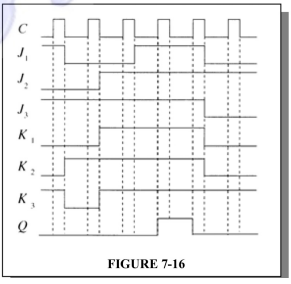



FIGURE 7-16

**22.** See Figure 7-18.

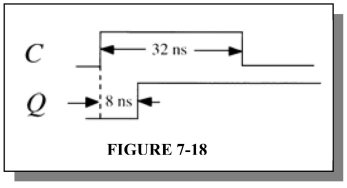



FIGURE 7-18

**24.** See Figure 7-19.

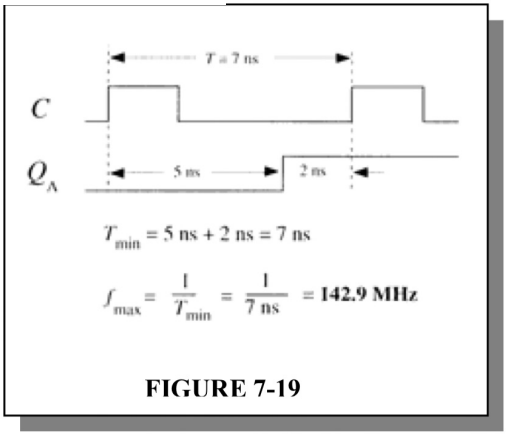



FIGURE 7-19

**27.** $t_W = 0.7RC_{EXT} = 0.7(3.3\ \text{k}\Omega)(2000\ \text{pF}) = \mathbf{4.62\ \mu s}$

**28.** $R_X = \dfrac{t_W}{RC_{EXT}} - 0.$ $t_W = 0.32\, R C_{ext}\left(1 + \frac{0.7}{R}\right)$ **6 kΩ**

$5\times10^{-3} = 0.32 \times R \times 10000\left(1 + \frac{0.7}{R}\right)$

$\Rightarrow R = 0.8625\ \text{k}\Omega$

**29.** See Figure 7-22.

$t_W = 0.25\ \text{s} = 1.1RC_1$

Choose $C_1 = 1\ \mu F$

$R_1 = \dfrac{t_W}{1.1C_1} = \dfrac{0.25\ \text{s}}{(1.1)(1\ \mu\text{F})} = 227\ \text{k}\Omega$ (use standard 220 kΩ)

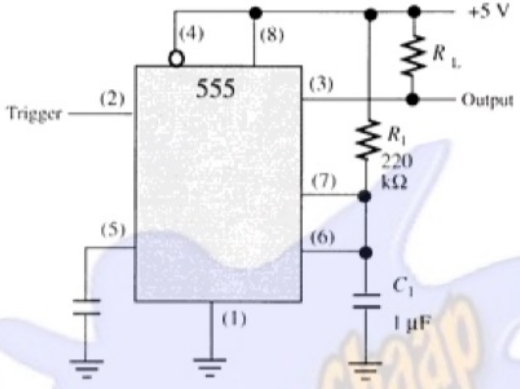



**FIGURE 7-22**

## *Section 7-6 Astable Multivibrator*

**30.** $f = \dfrac{1}{0.7(R_1 + 2R_2)C}$ $f = \dfrac{1.44}{(R_1+2R_2)C_1} = 26.7\ \text{KHz}$

**31.** $T = \dfrac{1}{f} = \dfrac{1}{20\ \text{kHz}} = 50\ \mu\text{s}$

*For a duty cycle of 75%:*

$t_H = 37.5\ \mu\text{s}$ and $t_L = 12.5\ \mu\text{s}$

$R_1 + R_2 = \dfrac{t_H}{0.7C} = \dfrac{37.5\ \mu\text{s}}{0.7(0.002\ \mu\text{F})} = 26{,}786\ \Omega$

$R_2 = \dfrac{t_L}{0.7C} = \dfrac{12.5\ \mu\text{s}}{0.7(0.002\ \mu\text{F})} = \mathbf{8{,}929\ \Omega}$ (use 9.1 kΩ)

$R_1 = 26{,}786\ \Omega - R_2 = 26{,}786\ \Omega - 8{,}929\ \Omega = \mathbf{17{,}857\ \Omega}$ (use 18 kΩ)