EE204 Autumn 2023
Tutorial 10
Date 1 Nov 2023

Q1) Assume the 8-bit flash ADC, as shown in Fig. 1, has V_{REF} =2.560 V.

(*a*) Find the total number of comparators, their voltage reference levels, and the maximum level tolerances allowed for a $\pm\frac{1}{2}$ LSB accuracy.

(*b*) Find $b1 \ldots b8$ and the quantization error for V_I = 0.5 V, 1.054 V, and 2.543 V.

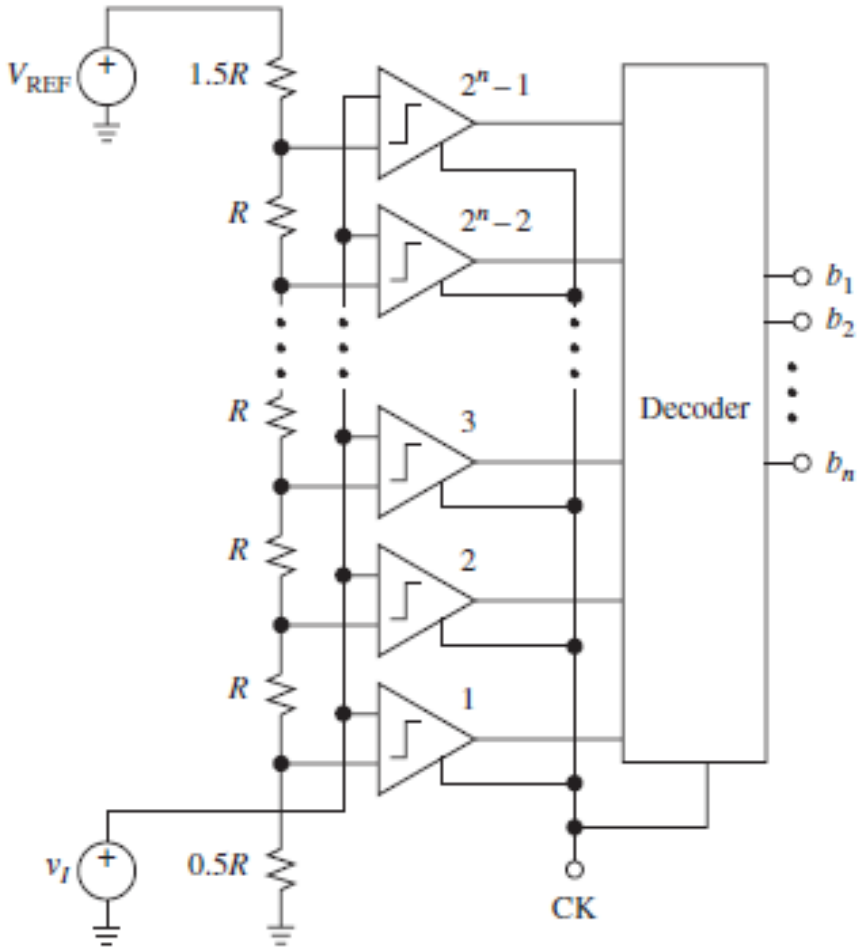

Figure 1

Q2) (a) Using a 0.5-nF capacitor C in the circuit of Fig. 2, find the value of R that results in an output pulse of 10-μs duration. (b) If the 555 timer used in (a) is powered with V_{CC} = 12 V, and assuming that V_{TH} can be varied externally (i.e., it need not remain equal to 2/3 V_{CC}), find its required value so that the pulse width is increased to 20μs, with other conditions the same as in (a).

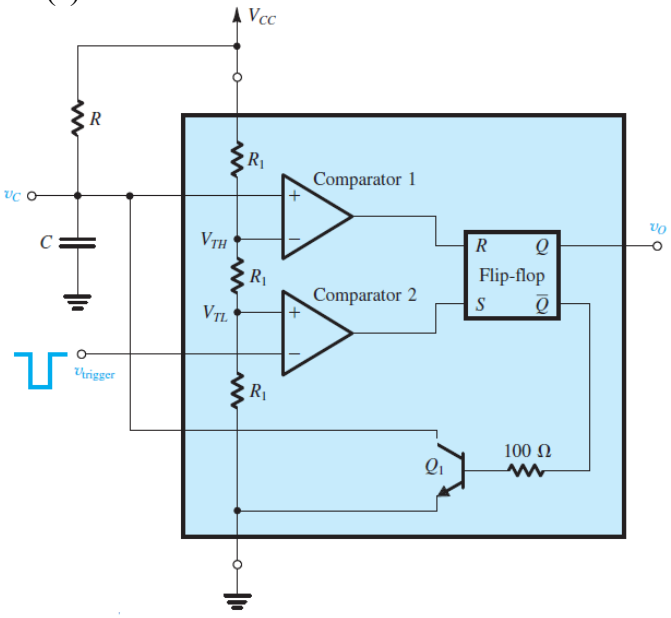

Figure 2

Q3) Using a 680-pF capacitor, design the astable circuit of Fig. 3 to obtain a square wave with a 20-kHz frequency and an 80% duty cycle. Specify the values of R_A and R_B.

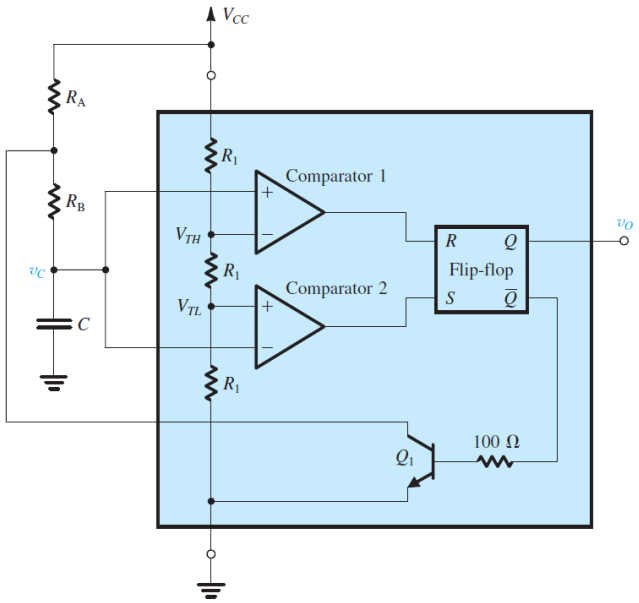

Figure 3