Sheet (3): Digital Instruments

1) Determine the maximum supply current required for a $3\frac{1}{2}$-digit LCD display that uses $350\ \mu A$ per segment.

2) A $4\frac{1}{2}$-digit seven-segment LED display draws a maximum supply current of $450\ mA$. Calculate the current taken by each segment.

3) A frequency divider circuit is made up of a $2\ MHz$ oscillator, a Mod-2^4 counter, and two decade counters. Determine the time period of the outputs from each counter.

4) Determine the quantization error for an ADC with a 16-bit output.

5) A 4-bit Flash ADC is designed with $V_{ref} = 2V$. Determine the thermometric code and the output digital code if the analog input is
   a. $100mV$
   b. $0.51V$
   c. $1.09V$
   d. $2.5V$

6) Design a Mod-12 counter using JK flip-flops.

7) Design a Mod-8 counter using D flip-flops.