Tutorial Assignments: Analog Signal Processing (EE60032),

Department of Electrical Engineering, Indian Institute of Technology, Kharagpur

Faculty: Ashis Maity Session: Autumn 2019

1. Find the resolution for a DAC if the output voltage is desired to change in 1 mV increments while using a reference voltage of 5V. [Ans: 13 bits]

2. From any non-ideal characteristics of the converter, find out INL and DNL. [One example has been shown in the class.]

3. A sinusoidal waveform is applied to a 12 bit ADC and the output is digitally analyzed. If the fundamental has a normalized power of 9 W while the remaining noise power is 0.5 µW, what is the effective number of bits of the converter? [Ans: 10.2 bits]

4. An 8-bit ADC has a reference voltage V_{ref}=4V. Find the RMS value of the quantization noise. Also find SNR of the ADC for full scale sine wave input and half scale sine wave input. [Solved in the class]

5. To a serial charge redistribution DAC, the word 1101 is applied to convert as an analog output. Follow through the sequence of events that result in conversion of this digital input word. [Solved in the class]

6. Assume M=2 and K=2, find out the transfer characteristic of this DAC if the scaling factor of the LSB sub-DAC is 3/8 instead of 1/4. Assume V_{ref}=1 V. What is the ±INL and ±DNL for this DAC? Is this DAC monotonic? [Ans: INL=1.5LSB, DNL=-1.5LSB]