ESE 2014 Digital Signal Processing and Storage

Assignment 3

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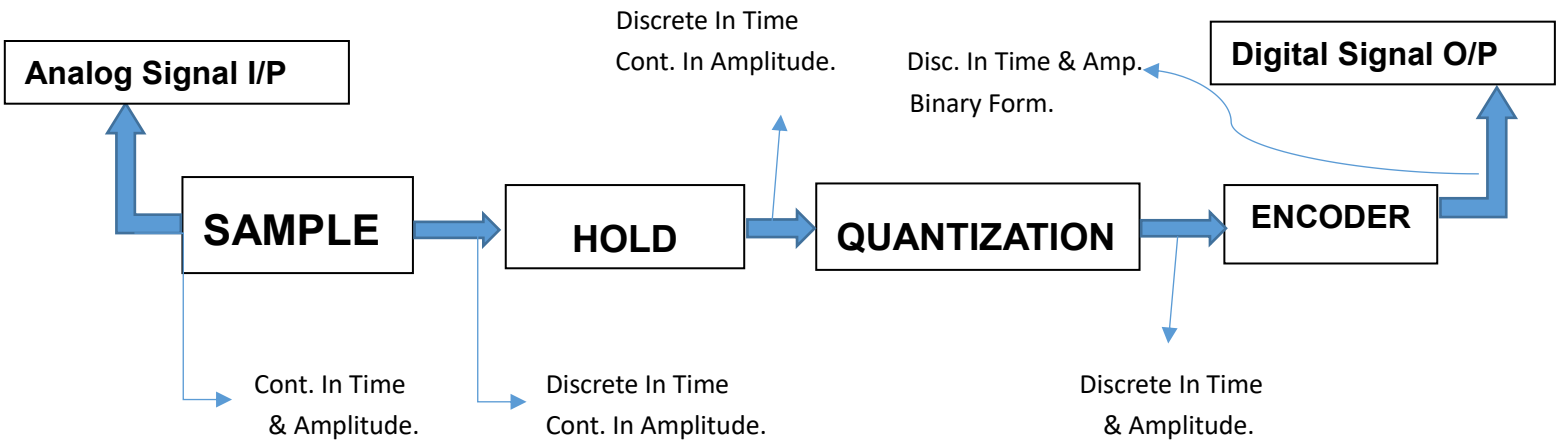
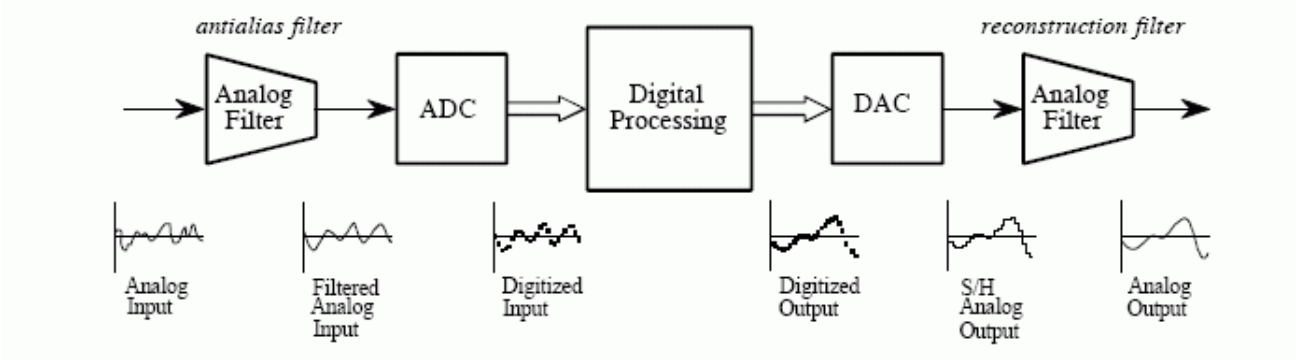
**1.** Draw a diagram of a basic analog to digital converter, and a digital to analog converter.

In today's era, we used electronics equipment everyand now where real world signals are mostly analog, these two converting interfaces are important to allow digital electronic equipment to process the analog signals. And for that we need **DAC (Digital To Analog Convertor) & ADC (Analog TO Digital Convertor)** SO the basic block diagram are shown below.



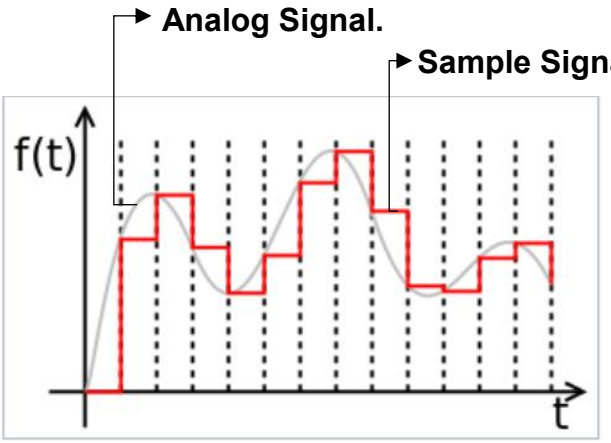

**Analog to Digital Convertor (ADC)**




**DSP (Digital Signal Processing)**

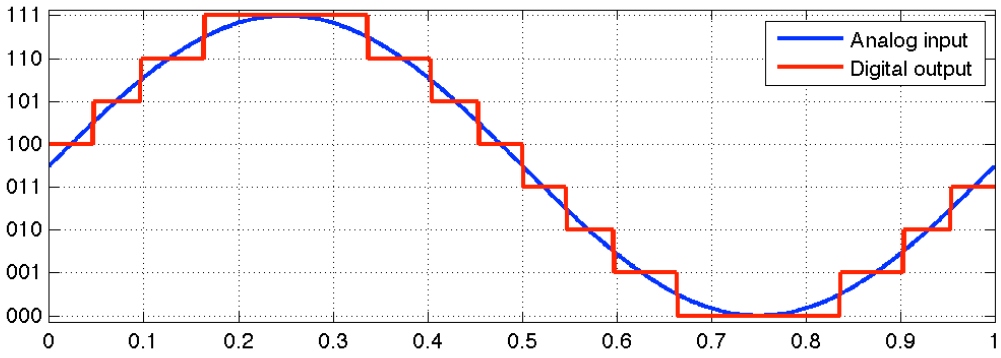
**2. Describe the basic meaning of sampling, quantization, and digitizing of a continuous signal.**

- **Sample & Hold: -** Simple & Follow is an analog device that samples the voltage of a continuously varying **analog Signal** and holds its value at a constant level for a specified minimum period of time. Similarly work as a Peak Detector or we can say it convert time varying voltage signal into discrete-time signal.




- **Quantization:-** Quantization is simply convert each real numbers with an approximation from a finite set of discrete values. Basically, that discrete values are denoted as fixed-point words.

**For Ex.** 3-bit resolution with 8 levels of quantization compared to analog.



- **Filters**:-

  Filters opt in virtually all sampled data systems. Analog-to-digital converters (ADCs) are preceded by a filter that removes frequency components that are beyond the ADC's range. Some ADCs have filtering inherent in their topology.

  ➡ **Antialiasing Filter**:- The sampled input signal must be bandlimited to prevent aliasing (waves of higher frequency being recorded as a lower frequency).Anti-aliasing filter also known as a Low Pass Filter(LPF) which is used to remove high frequency component in the input signal and help to reproduce signal for the ADC range.

  ➡ **Reconstruction Filter**:- The final output signal needed to be bandlimited, to preventing imaging. So as a same reason LPF used to reconstruct the output signal and resample them to generate a final output.