Pre Lab Questions

What is meant by quantization?

* Quantization is the process of mapping continuous infinite value to a smaller set of discrete finite values.

2) Compare uniform and non-uniform quantization.

* The difference between uniform and non-uniform quantization is that uniform quantization has equal step sizes while in non uniform quantization, the step sizes not equal.

3) What are the steps involved in D/A converter?

* Audio signal processing

* Basic Digital to Analog converter

* Binary weighted Registera DAC

* R-2R Ladder digital to Analog converter (DAC)

* Motor control Application

4) Define aliasing.

* Aliasing refers to the effect produced when a signal is imperfectly reconstructed from the original signal. Aliasing occurs when a signal is not sampled at a high enough frequency to create an accurate representation. The example is sinusodial function.

Post Lab Questions.

What is quantization error?

* Quantization error is the difference between the the analog signal and the closet available digital value at each sampling instant from the A/D. converter. Quantization error also introduces noise called quantization noise, to the sampling signal.

2). What are the major sources of noise in a PCM system?

* The performance of a PCM system is influenced by two major sources of noise.

* The quantization noise which is introduced in the transmitter and is carried all the way to receiver output.

* The channel noise which is introduced anywhere between the transmitter and the receiver.

3). What is meant by encoding?

* Encoding is the process by which information from a source is converted into symbols to be communicated

* Transmitter is responsible for "encoding" i.e, inserting clocks into data according to a selected, codining schemes.

Figure 6.4 PCM Waveform with DC input

6.9 Observation

PCM Modulation (With AC input)

Signal	Amplitude	Time Period	
AC input	12 V	2KHz	0.5ms
Clock Signal	10V	53KHz	0.018ms
Sample and hold signal	5V	2KHz	0.5ms
PCM Output	10V	11KHz	0.09ms

10 10 0101 → +ve
10 10 0101 → -v

PCM Demodulation (with AC input)

0101 01010 → +ve
0 10101010 → -ve

Signal	Amplitude	Time Period
D/A Converter output Signal	6V	8KHz
LPF output signal		
Demodulated output	6V	40KHz 0.025 ms

PCM Modulation (With DC input)

Signal	Amplitude	Time Period
DC input	3.8V	
Clock Signal	10 V	6.06KHz = 0.016 ms
PCM Output	10V	50KH2 = 0.02 ms

PCM Demodulation (With DC input)

Signal	Amplitude	Time Period
D/A Converter output Signal	6.40V	21KHz. 0.04 ms
LPF output signal		
Demodulated Output	2.5 V	

6.10 Post Lab Questions

1. What is quantization error?

(V)

AC Input Signal

x axis 1cm = 0.20m

y axis 1cm = 2V

0.5   1   1.25   1.5   time period (ms)

6
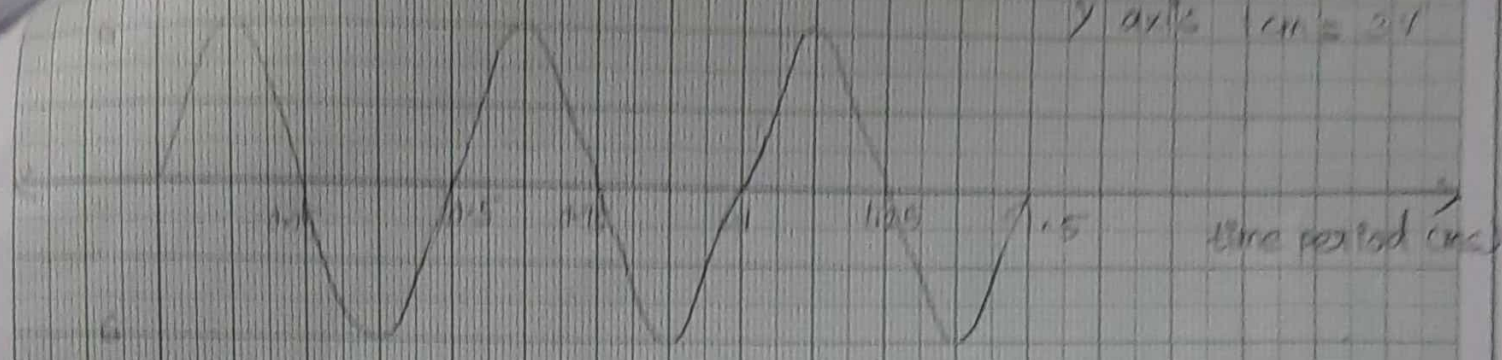
Clock signal

x axis 1cm = 0.08ms

y axis 1cm = 3.3V

0.012 0.024 0.036 0.048 0.06 0.072 0.084 0.096 0.108 0.12 0.132 0.144 0.156 0.168 0.18 0.198 0.216   time period (ms)

PCM Output

x axis 1cm = 0.04 ms

y axis 1cm = 5V

1 0 1 1 0 1 1 0 1 1 0 1 1 1 0 1 1 0 1 1 1
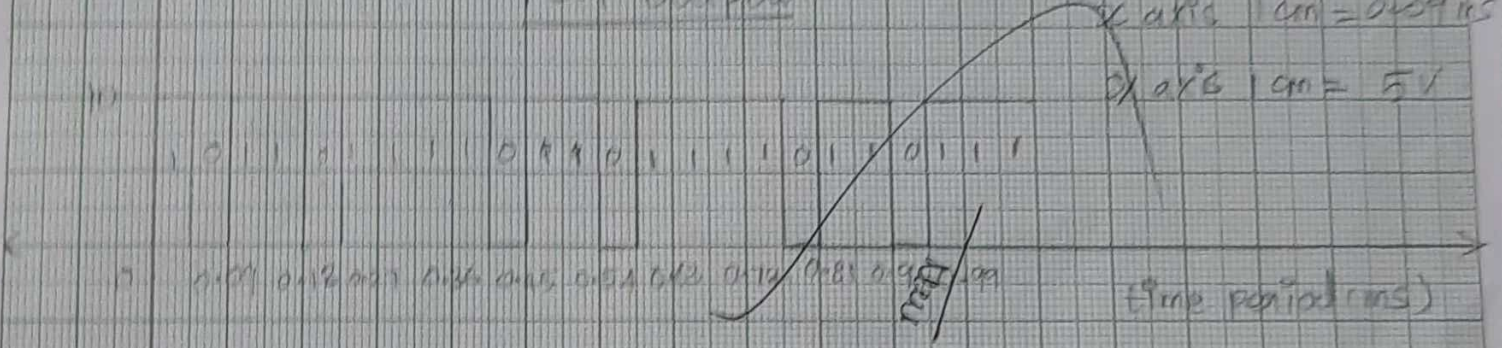
0.04 0.12 0.21 0.44 0.45 0.54 0.63 0.72 0.81 0.90 0.99   time period (ms)

Demodulated Output

x axis 1cm = 0.00625m

y axis 1cm = 10V

20

0

-20
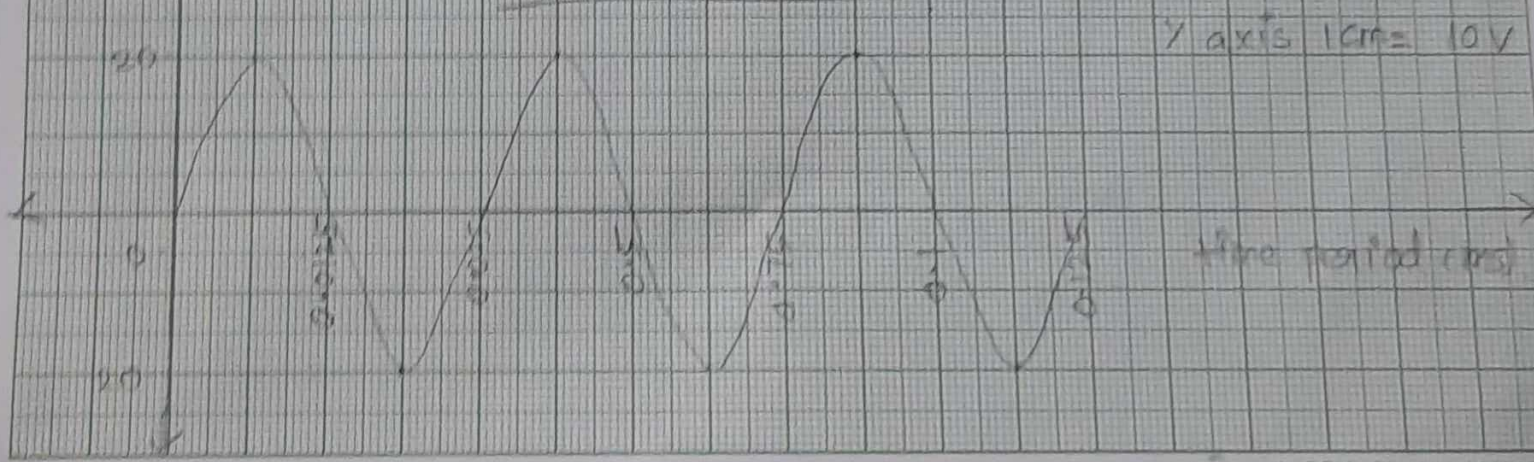
time period (ms)

Amplitude (V)

DC Input Signal   Y axis 1 cm = 1.9 V

time period (cms)

Clock Signal

10V

x axis 1 cm = 0.0016ms

Y axis 1 cm = 3.3V

time period (cms)

x axis 1 cm = 0.02m

Y axis 1cm = 3.3V

PCM signal

10V

1 1 0   0 0 0 0 1 1 1 0 1 1 0 1 0 0 0 0 0 1 1 1 0 1 1 0 1

time period (cms)

0.02 0.04 0.06 0.08 0.1 0.12 0.14 0.16 0.18 0.2 0.22 0.24

Demodulated Output

Y axis 1cm = 1.75V

3.5

time period (cms)

Amplitude(v)