**LAB#03**

**Object:** Effect of Quantization on analog signal.

**TASK #01:**

Plot the two CT signals of 10hz & 110hz for t=0 tp t=0.2sec sampled at fs=100hz & plot them in discrete form.

**CODING:**

f1=10;

f2=110;

fs=100;

t1=0:1/fs:1/f1;

t2=0:1/fs:11/f2;

x1=sin(2\*pi\*f1\*t1)

x2=sin(2\*pi\*f2\*t2)

subplot(2,1,1)

stem(t1,x1)

subplot(2,1,2)

stem(t2,x2)

**FIGURE:**

**TASK #02:**

For a C.T signal x=sin(2πft)

1. Plot the signal x(n) for n=0 to 99 for f=[500 2000 3000 4500] sampled at fs=5000hz.
2. Suppose that f=2khz & fs=50khz.
3. Plot the signal x(n).
4. Plot the signal x(n) created by even number samples of x(n)

**CODING:**

1. Plot the signal x(n) for n=0 to 99 for f=[500 2000 3000 4500] sampled at fs=5000hz.

fs=5000

n=0:99

for b=1:4

f=[500 2000 3000 4500]

x=sin(2\*pi\*f(b)\*n/fs)

subplot(2,2,b)

stem(n,x)

end

**FIGURE:**



1. Suppose that f=2khz & fs=50khz.
2. Plot the signal x(n).
3. Plot the signal x(n) created by even number samples of x(n)

fs=50000

n=0:2:99

f=2000

x=sin(2\*pi\*f\*n/fs)

stem(n,x)

**FIGURE:**



**TASK #03:**

Simulate a DTCV sinusoid 1/50 hz with the length of the signal to be 500.Choose the number of significant digits for round off & apply the signal generated compute error signal SQNR.

**CODING:**

fd=1/50;

n=0:499;

q=input('No. of Digits after Decimal points to be retained (0-9): ');

x=cos(2\*pi\*fd\*n);

Px=sum(abs(x).^2)/length(x)

xq=round(x\*10^q)/10^q;

xe=x-xq;

Pe=sum(abs(xe).^2)/length(xe)

SQNR=10\*log10(Px/Pe)

**RESULT:**

No. of Digits after Decimal points to be retained (0-9): 2

Px = 0.5000

Pe = 6.3741e-006

SQNR = 48.9455

**TASK #04:**

For f=1/50 hz and N=200 , Write a program to quantize the signal x(n) using following. In each case plot the signals x(n) ,xq(n) & xe(n) . Compute SQNR

1. Truncation.
2. Round off to 64 , 128 & 256 signal levels.

**CODING:**

fd=1/50;

n=0:199;

q=4;

x=cos(2\*pi\*fd\*n);

subplot(2,3,1)

stem(n,x)

title('Original Signal')

Px=sum(abs(x).^2)/length(x)

xq=fix(x\*10^q)/10^q;

xe=x-xq;

Pe=sum(abs(xe).^2)/length(xe)

SQNR=10\*log10(Px/Pe)

subplot(2,3,2)

stem(n,xe)

title('Error Signal')

subplot(2,3,3)

stem(n,xq)

title('Truncation')

q1=6;

xq1=round(x\*10^q1)/10^q1;

subplot(2,3,4)

stem(n,xq1)

title('Round off to 64 ')

q2=7;

xq2=round(x\*10^q2)/10^q2;

subplot(2,3,5)

stem(n,xq2)

title('Round off to 128 ')

q3=8;

xq3=round(x\*10^q3)/10^q3;

subplot(2,3,6)

stem(n,xq3)

title('Round off to 256 ')

**RESULT:**

Px = 0.5000

Pe = 3.2560e-009

SQNR = 81.8628

**FIGURE:**

