



American International University- Bangladesh

COE 3103: DATA COMMUNICATION

Mid Lab Report 03 Spring 2021-2022

Section: Q
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Submitted by,

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Tasks

Performance Task for Lab Report: (your ID = AB-CDEFG-H)

$$x(t) = (H+5) \cos(2\pi((D+E+5)*10)t) + (H+7) \sin(2\pi((E+F+10)*10)t)$$

Q: Apply uniform quantization on signal 'x(t)' using both of the manual quantization methods learnt in this manual. Use ($2^H + 2$) levels for first method and use ($12 - 2^H$) levels for the second one. Attach codes and necessary figures in your report.

Solution of Performance Task (Method 1)

```
%ID: 19-41468-3
A = 1;
B = 9;
C = 4;
D = 1;
E = 4;
F = 6;
G = 8;
H = 3;

a1 = H+5; %a1 = 8
a2 = H+7; %a2 = 10
f1 = (D+E+5)*10; %f1 = 100
f2 = (E+F+10)*10; %f2 = 200

fs = 10000;
t = 0:1/fs:1;

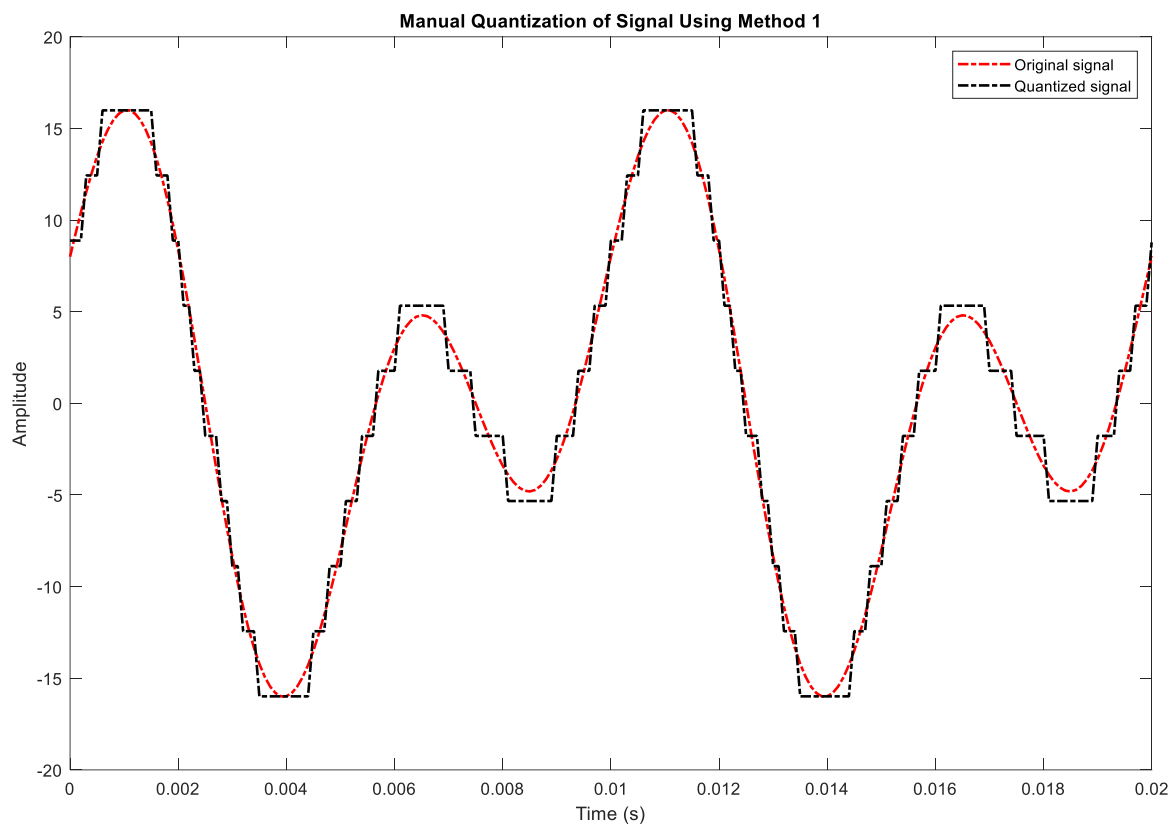
x = (a1*cos(2*pi*f1*t)) + (a2*sin(2*pi*f2*t));

L = 2^H + 2; %L = 10
delta=(max(x)-min(x))/(L-1);
xq = min(x)+(round((x-min(x))/delta)).*delta;

plot(t,x,'r-.', 'linewidth',1.5);
hold on;
plot(t,xq,'k-.', 'linewidth',1.5);
axis([0 0.02 -20 20]);

title('Manual Quantization of Signal Using Method 1');
legend('Original signal','Quantized signal');
xlabel('Time (s)');
ylabel('Amplitude');
```





Solution of Performance Task (Method 2)

%ID: 19-41468-3

```
A = 1;
B = 9;
C = 4;
D = 1;
E = 4;
F = 6;
G = 8;
H = 3;
```

```
a1 = H+5; %a1 = 8
a2 = H+7; %a2 = 10
f1 = (D+E+5)*10; %f1 = 100
f2 = (E+F+10)*10; %f2 = 200
```

```
fs = 10000;
t = 0:1/fs:1;
```

```
x = (a1*cos(2*pi*f1*t)) + (a2*sin(2*pi*f2*t));
```

```
L = 12- 2^H; %L = 4
Am = (max(x)-min(x))/2;
```



```

Nsamples = length(x);
quantised_out = zeros(1,Nsamples);
del = (2*Am)/L;
Llow = -Am+del/2;
Lhigh = Am-del/2;

for i=Llow:del:Lhigh
    for j=1:Nsamples
        if ((i-del/2)<=x(j))&&(x(j)<=(i+del/2)))
            quantised_out(j)=i;
        end
    end
end

plot(t,x,'r-.', 'linewidth',1.5);
hold on;
plot(t,quantised_out,'k-.', 'linewidth',1.5);
axis([0 0.02 -20 20]);

title('Manual Quantization of Signal Using Method 2');
legend('Original signal','Quantized signal');
xlabel('Time (s)');
ylabel('Amplitude');

```

