```matlab
% 19ucc023
% Mohit Akhouri
% Experiment 2 - Observation 5

% doing quantization and encoding for L=8 via Simulink model

sim('Simulink_Observation_5'); % calling the Simulink model

n_cycles = 5; % defining number of cycles
f = 3000; % defining message signal frequency
fs_sampled = 8000; % defining Sampling frequency
A = 1; % defining Amplitude
L = 8; % defining number of levels for the quantizer

n_sampled = 0:1:floor(n_cycles*(fs_sampled/f))-1; % defining the range
 of "n"
x_sampled = A*cos(2*pi*f*n_sampled*(1/fs_sampled)); % defining the
 sampled signal

% plotting sampled and quantized signal separately
figure;
subplot(2,1,1);
stem(n_sampled,x_sampled,'Linewidth',1.5);
xlabel('samples(n) ->');
ylabel('Amplitude ->');
title('Sampled signal for F_{s} = 8000 Hz');
grid on;
subplot(2,1,2);
stem(n_sampled,out.y_sampled.data,'Linewidth',1.5);
xlabel('samples(n) ->');
ylabel('Amplitude ->');
title('Quantized signal for L = 8');
grid on;
sgtitle('19ucc023 - Mohit Akhouri');

% plotting sampled and quantized signal together
figure;
stem(n_sampled,x_sampled,'Linewidth',1.2);
hold on;
stem(n_sampled,out.y_sampled.data,'Linewidth',1.2);
xlabel('Samples(n) ->');
ylabel('Amplitude ->');
title('19ucc023 - Mohit Akhouri','Sampled Signal and Quantized signal
 for L = 8');
grid on;
legend('Sampled Signal','Quantized Signal');
hold off;

% doing encoding of quantized signal via Simulink
y = out.y_sampled.data;
y_encoded = out.y_encoded.data;
% doing encoding of quantized signal
```

```matlab
display('The encoded signal is :');
for i=1:length(y)
    display(sprintf('%-10f = %s',y(i),dec2bin(y_encoded(i),3))); %
 displaying the encoded values
end
```
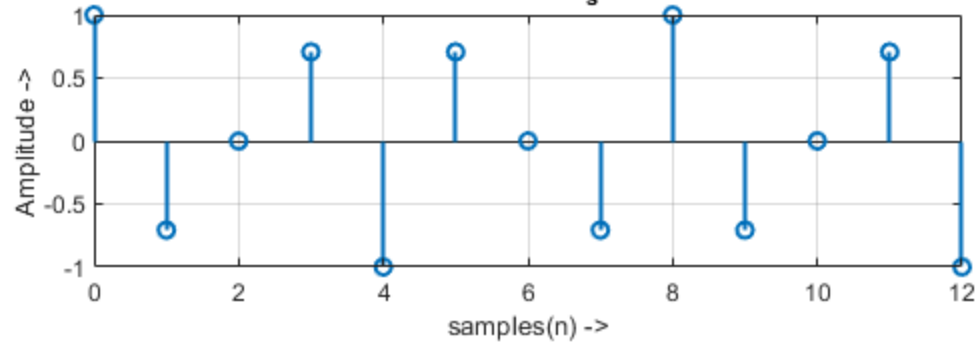
```
The encoded signal is :
1.000000   = 111
-0.750000  = 001
0.000000   = 011
0.750000   = 111
-1.000000  = 000
0.750000   = 111
0.000000   = 011
-0.750000  = 001
1.000000   = 111
-0.750000  = 001
0.000000   = 011
0.750000   = 111
-1.000000  = 000
```
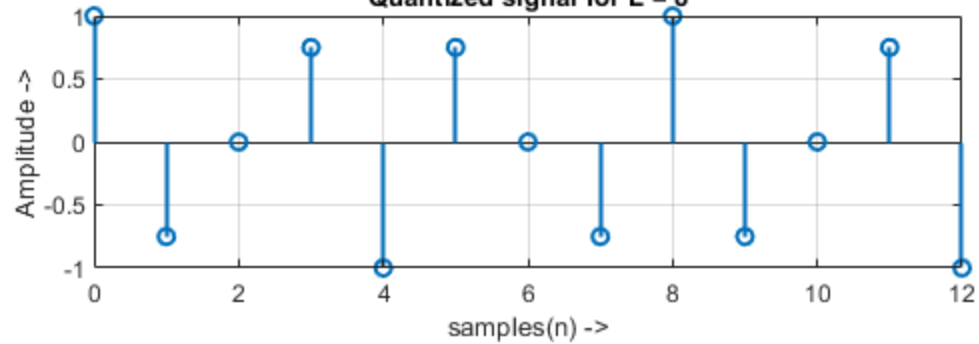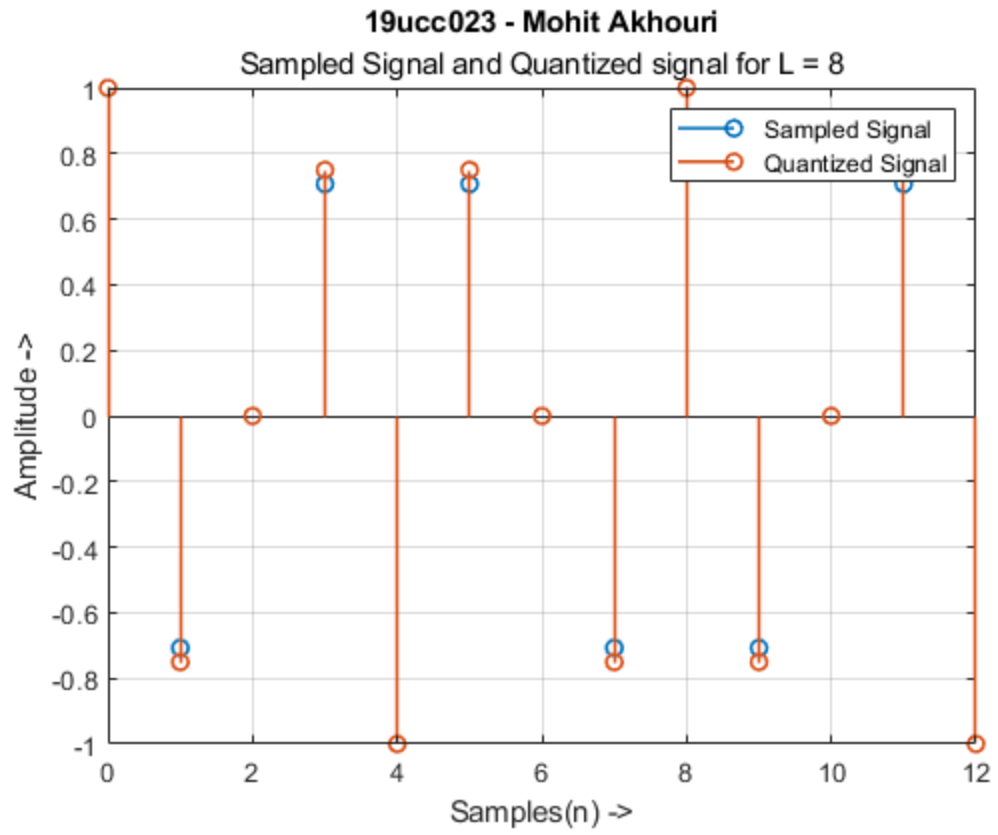

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Sampled signal for $F_s = 8000$ Hz

Quantized signal for L = 8

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Sampled Signal and Quantized signal for L = 8

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