**EC-431** **Digital Communication (Marks = 20)**

**Assignment 1**

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**Design a modem uses FSK. Implement it on MATLAB.**

**CODE:**

% Define parameters

f1 = 1; % Frequency for binary '1' in kHz

f0 = 0.5; % Frequency for binary '0' in kHz

bitRate = 1; % Bit rate in bits per second

Fs = 100; % Sampling frequency in Hz

duration = 1; % Duration of each bit in seconds

t = 0:1/Fs:duration-1/Fs; % Time vector

% Sample binary data

data = [0 1 0 1 1 0 1];

% Modulate the data

modulatedSignal = fsk\_modulate(data, f1, f0, t);

% Demodulate the signal

demodulatedData = untitled4(modulatedSignal, f1, f0, t, Fs);

% Display original and decoded data

disp('Original Data:');

disp(data);

disp('Demodulated Data:');

disp(demodulatedData);

**Function to modulate:**

function y = fsk\_modulate(data, f1, f0, t)

y = [];

for i = 1:length(data)

if data(i) == 1

y = [y cos(2\*pi\*f1\*t)]; % Cosine for '1'

else

y = [y cos(2\*pi\*f0\*t)]; % Cosine for '0'

end

end

end

**Function to demodulate:**

function decodedData = untitled4(y, f1, f0, t, Fs)

decodedData = [];

for i = 1:length(t):(length(y)-length(t)+1)

% Extract one bit period

y\_bit = y(i:i+length(t)-1);

% Calculate energy around each frequency

energy1 = bandpower(y\_bit, Fs, [f1-0.1 f1+0.1]);

energy0 = bandpower(y\_bit, Fs, [f0-0.1 f0+0.1]);

% Decision based on energy

if energy1 > energy0

decodedData = [decodedData 1];

else

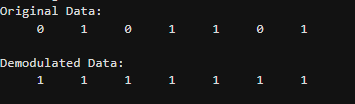
decodedData = [decodedData 0];

end

end

end

**OUTPUT:**

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