AMERICAN INTERNATIONAL UNIVERSITY-BANGLADESH

Faculty of Science and Technology

Course Title: Data Communication[G]

Lab Report-6

Exp. Title: Study of Amplitude Modulator and Demodulator using Simulink

Submitted by: [Group-2]

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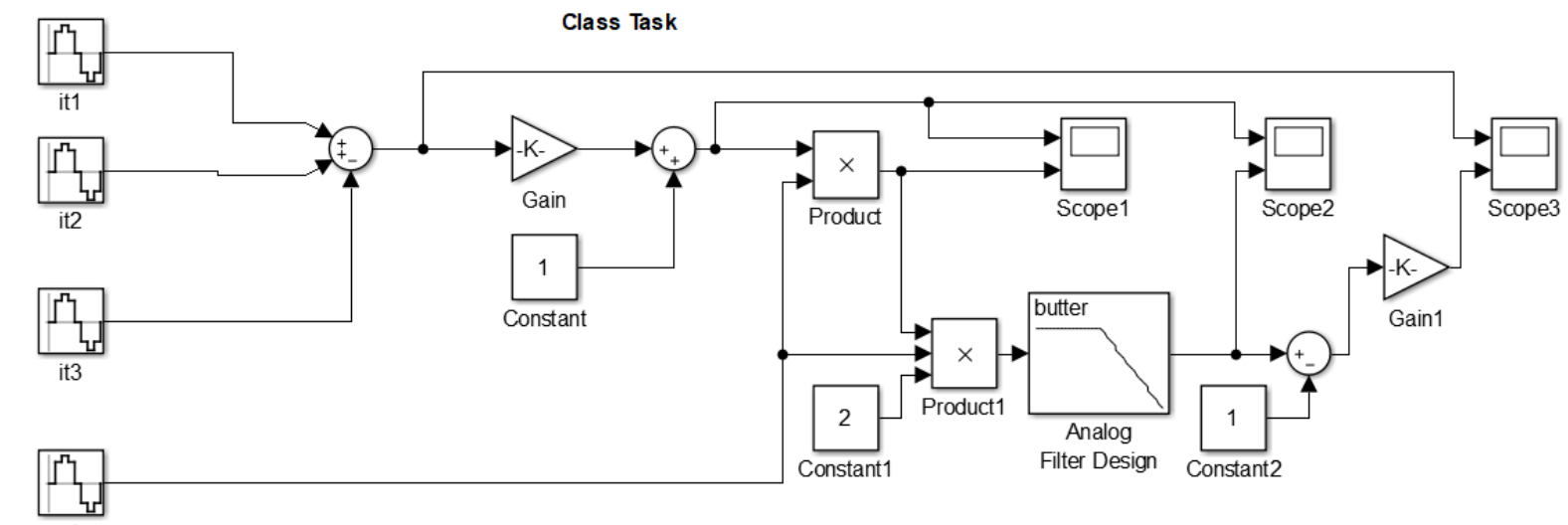
Class Task:

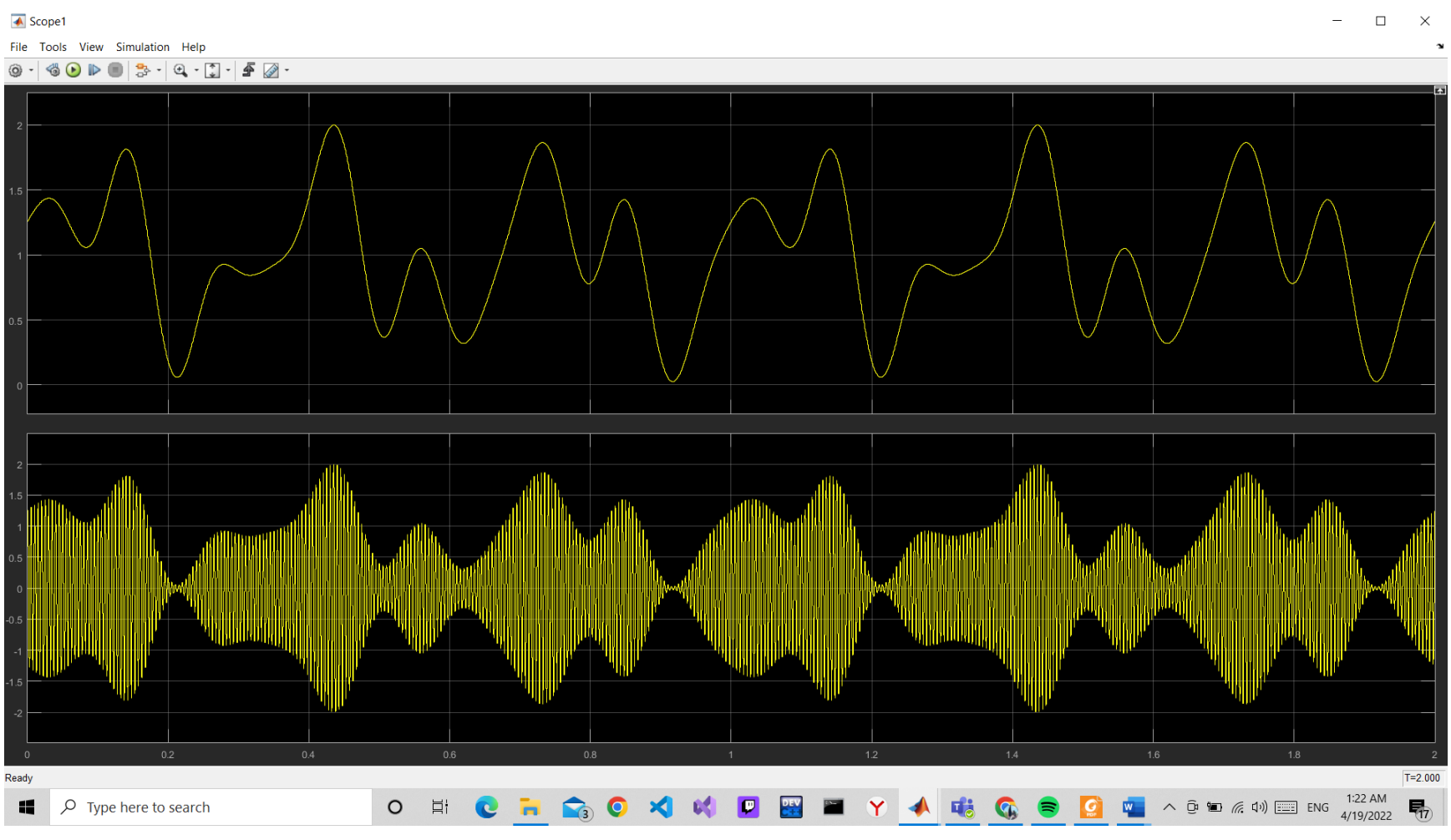
Lab Report 6:
*** Apply amplitude modulation and demodulation on a composite signal:
# Input Signal, it = 6*sin(2*pi*3*t) + 5*cos(2*pi*7*t) - 2*cos(2*pi*10*t);
# Carrier Signal, ct = cos(2*pi*200*t)

Simulink Block Diagram:

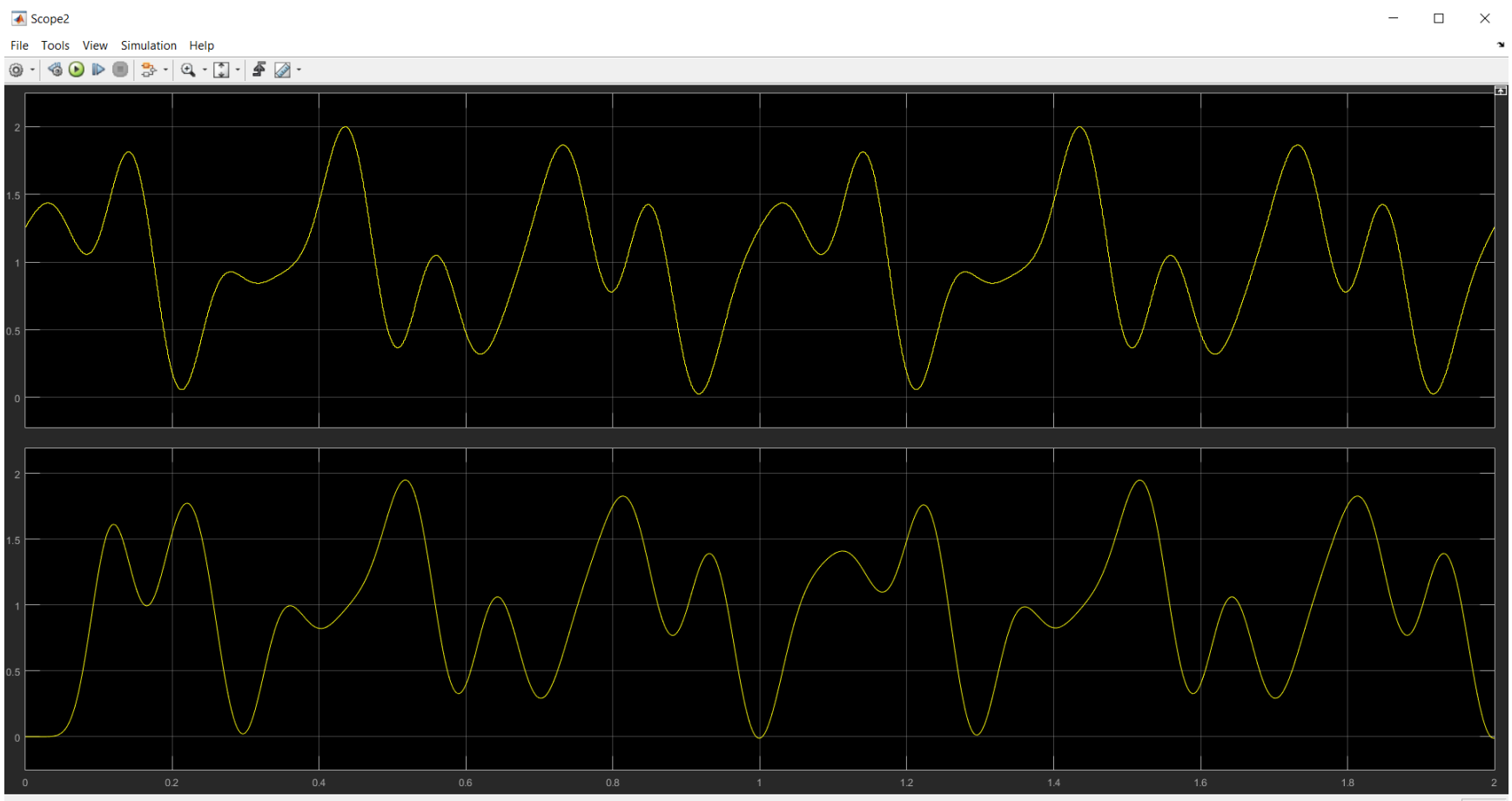


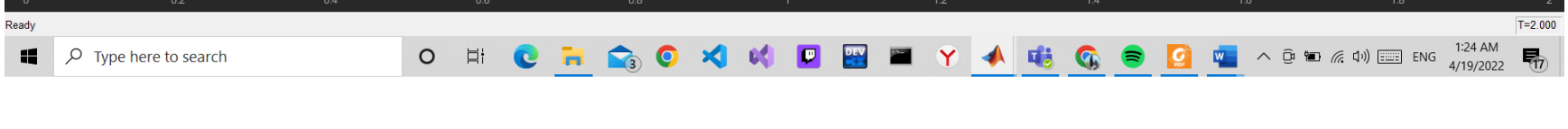
Procedure: At first, we opened Simulink in MATLAB and select blank model. Then from library browser we choose the necessary components. As our signal has 3 frequency components, we took 3 sin waves and a carrier signal. Then we took a sum of three-input for producing the composite signal. Then we took a gain which works like a multiplier and converts the signal into a unipolar signal. Then we took another sum to add a constant. Then we took a product to multiply the unipolar signal with carrier signal in order to complete modulation. Then we took a scope to see the modulated signal as output. For demodulation, at first, we took a product to multiply modulated signal with a constant and carrier signal. Then we pass the signal through the low pass filter where we used a frequency which is a little more than the highest frequency component present in our input signal. After then we took the second scope to see the demodulation as output. Finally, for recovering the signal we used another sum to add the constant with the demodulated signal. Then we took another gain to recover the actual signal. Finally, we took another scope to see the final output which is the recovered signal.

Modulation Output Scope:

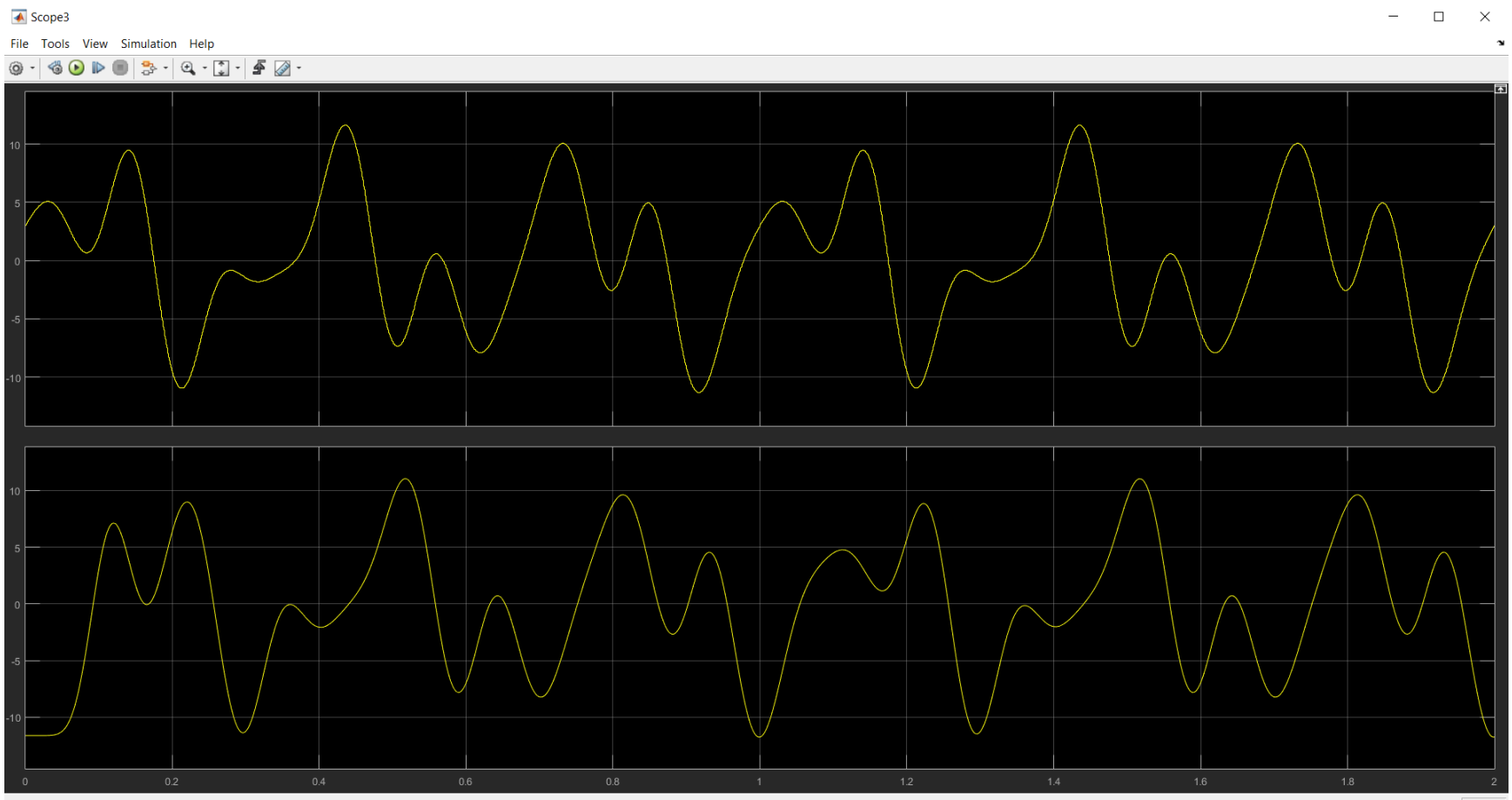


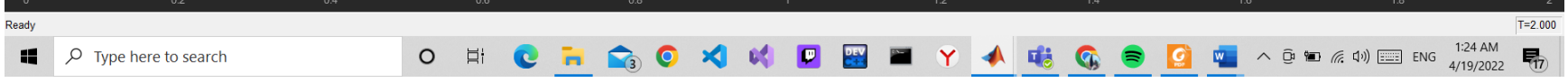
Demodulation Output Scope:





Scope for original signal and recovered signal:





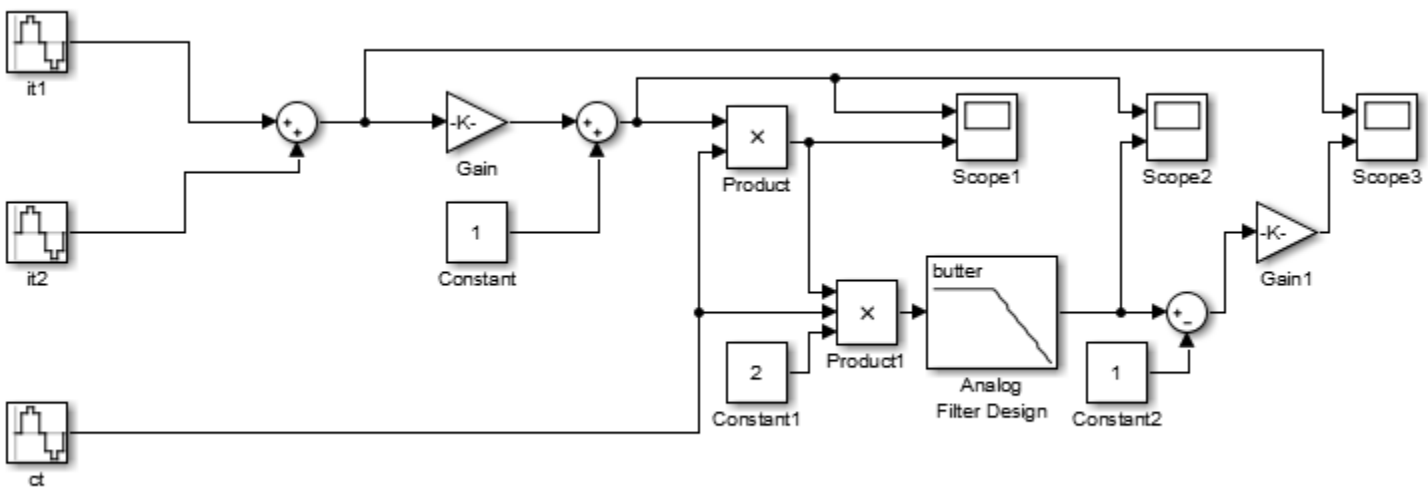
Performance Task:

Implement the following demodulation in Simulink to retrieve the original signal:

You have a signal ‘m(t) = (2*sin(2*pi*4*t)+3*cos(2*pi*6*t))’. Apply amplitude modulation (AM) on the given signal with carrier signal ‘c(t) = cos(2*pi*50*t)’, and then do demodulation to get back the original message signal m(t). Remember your demodulated signal should have same amplitude and frequency as m(t) has.

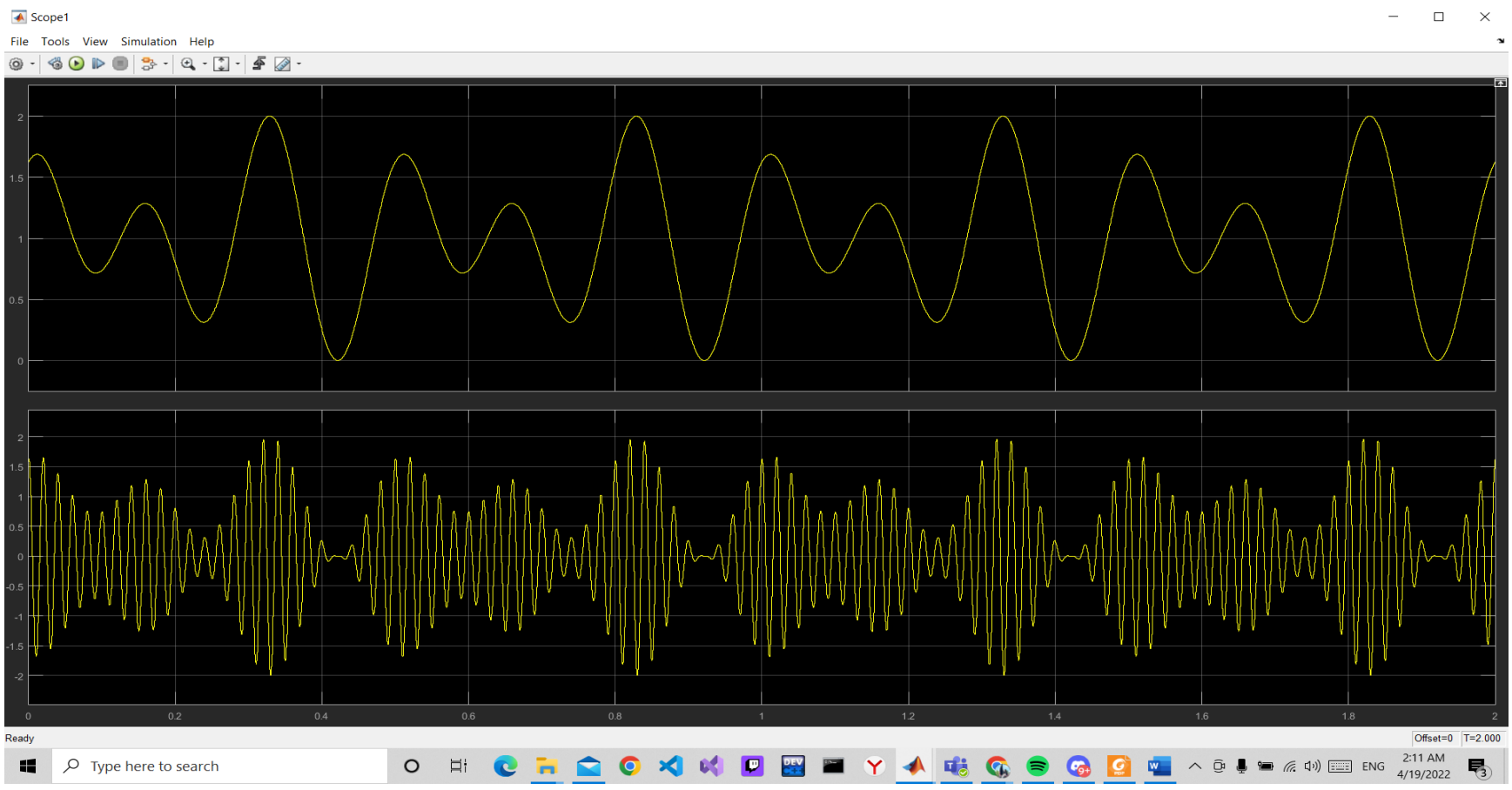
- Formula for modulation: s(t) = (1+ (m(t)))*c(t)
- Formula for demodulation: m’(t) = (s(t)*2*c(t)-1) [Remember you have to use a low pass filter here to match m’(t) with m(t)]
- Provide five screenshots in your report. First one for modulation block, second one for demodulation block, third one for whole block, fourth one for scope with original, carrier and modulated signal, fifth one for scope with original and recovered signal.
- Every screenshot must cover your full monitor screen.
- Your Name, ID, and Section must be visible in every screenshot.

Simulink Block Diagram:

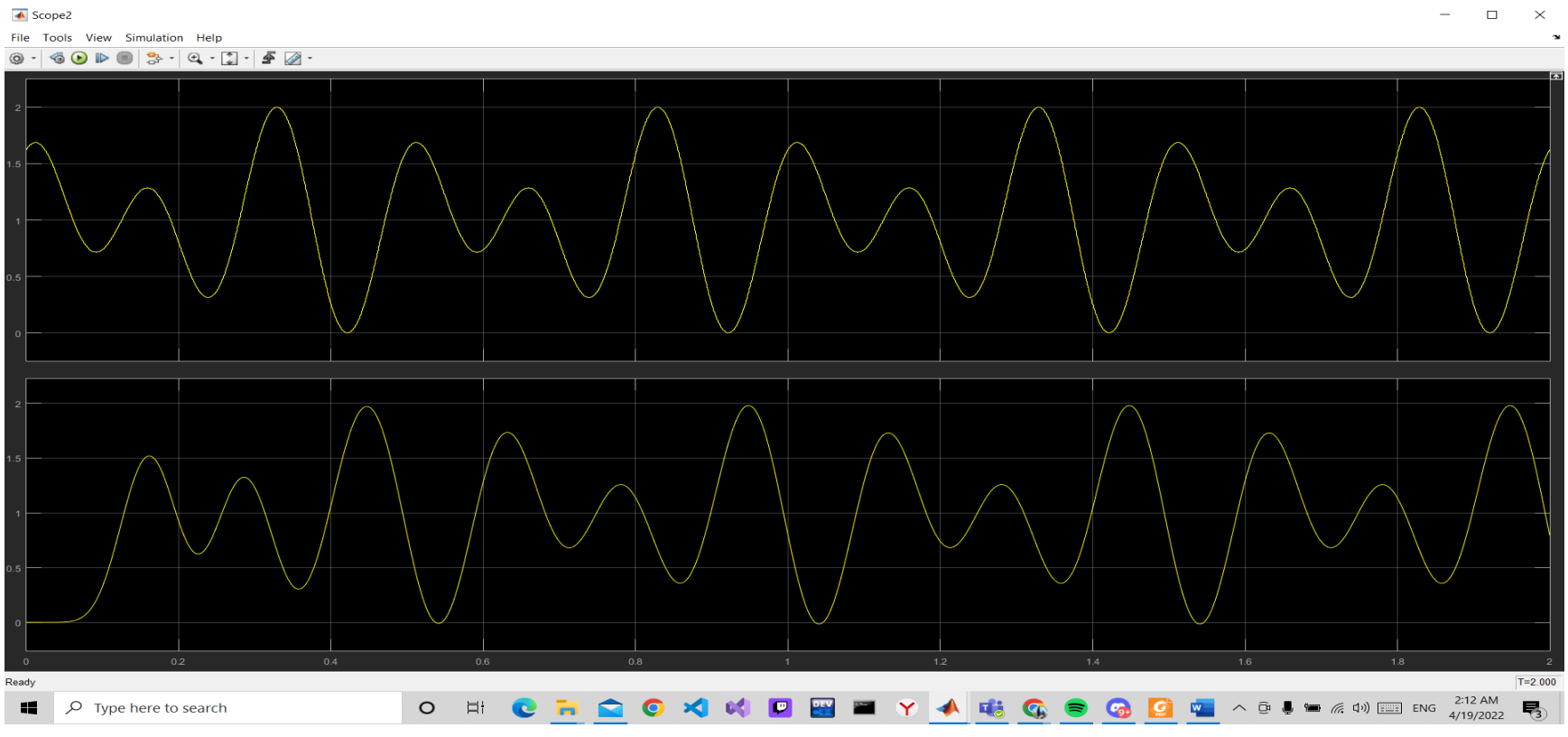


Procedure: At first, we opened Simulink in MATLAB and select blank model. Then from library browser we choose the necessary components. As our signal has 2 frequency components, we took 2 sin waves and a carrier signal. Then we took a sum of two-input for producing the composite signal. Then we took a gain which works like a multiplier and converts the signal into a unipolar signal. Then we took another sum to add a constant. Then we took a product to multiply the unipolar signal with carrier signal in order to complete modulation. Then we took a scope to see the modulated signal as output. For demodulation, at first, we took a product to multiply modulated signal with a constant and carrier signal. Then we pass the signal through the low pass filter where we used a frequency which is a little more than the highest frequency component present in our input signal. After then we took the second scope to see the demodulation as output. Finally, for recovering the signal we used another sum to add the constant with the demodulated signal. Then we took another gain to recover the actual signal. Finally, we took another scope to see the final output which is the recovered signal.

Modulation Output Scope:



Demodulation Output Scope:



Scope for original signal and recovered signal: