AMERICAN INTERNATIONAL UNIVERSITY–BANGLADESH (AIUB)

DATA COMMUNICATION

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Section: D

LAB REPORT ON

Study of Amplitude Modulator and Demodulator using Simulink

Supervised By

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Submitted By:

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Part-1

Title: Study of Amplitude Modulator and Demodulator using simulink.

Objective: This experiment is designed to—

① To understand the use of simulink for AM modulation.

② To develop understanding of AM demodulation

Working principle:

1. Message signal: A low-frequency sine wave represents the information signal

2. Carrier signal: A high-frequency sine wave represents the info.

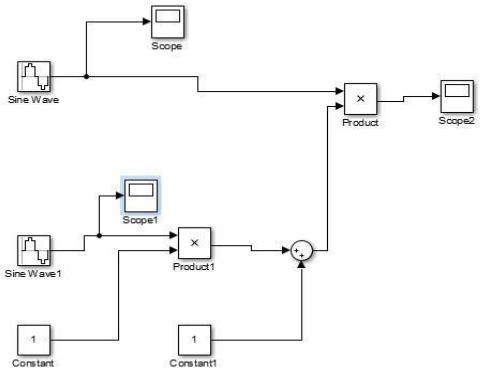
3. Modulation process:

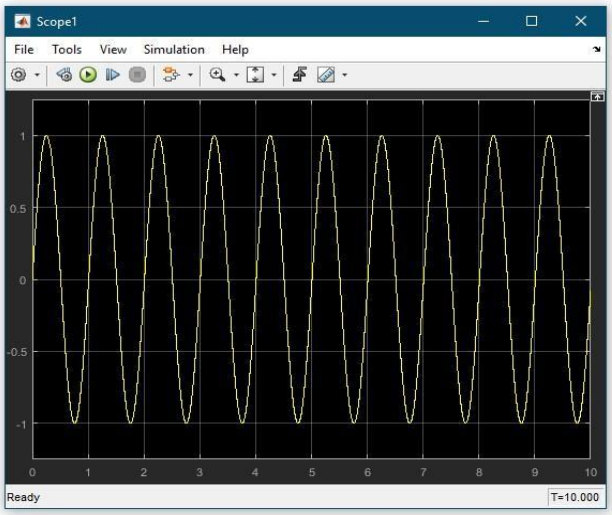
- modulation index (m) = $\frac{Am}{Ac}$
- $y(t) = 1 + m \cdot \sin(2\pi f_m t)) \cdot Ac \cdot \sin(2\pi f_c t)$

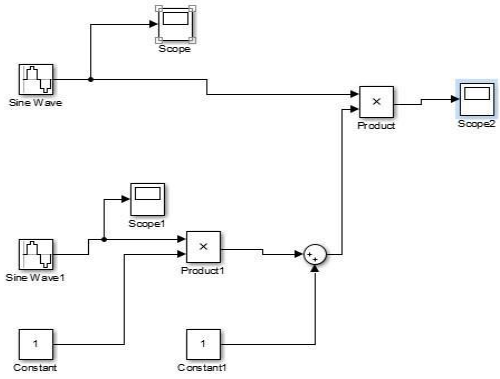
[modulation Eqn]

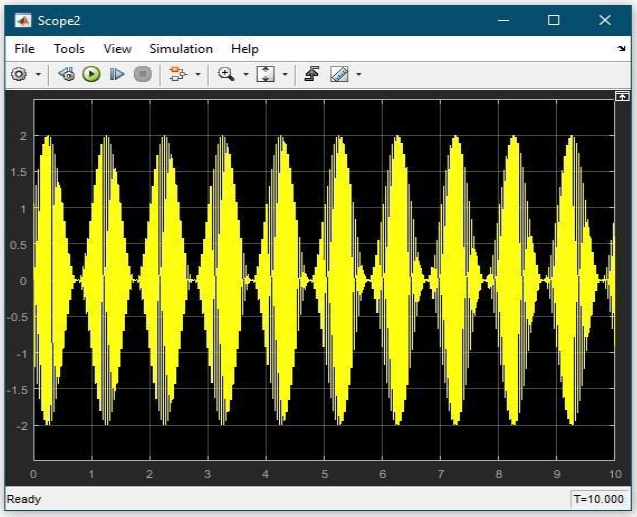
- Add constant 1 to the scaled message Sum block
- Multiply the result product block.

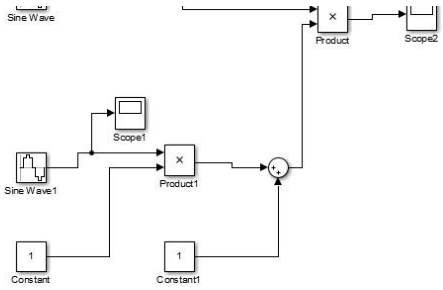
Block Dagram:

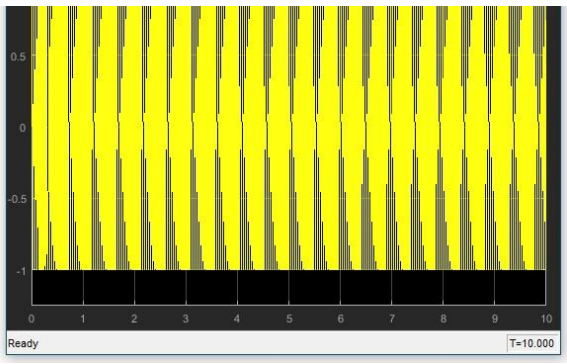




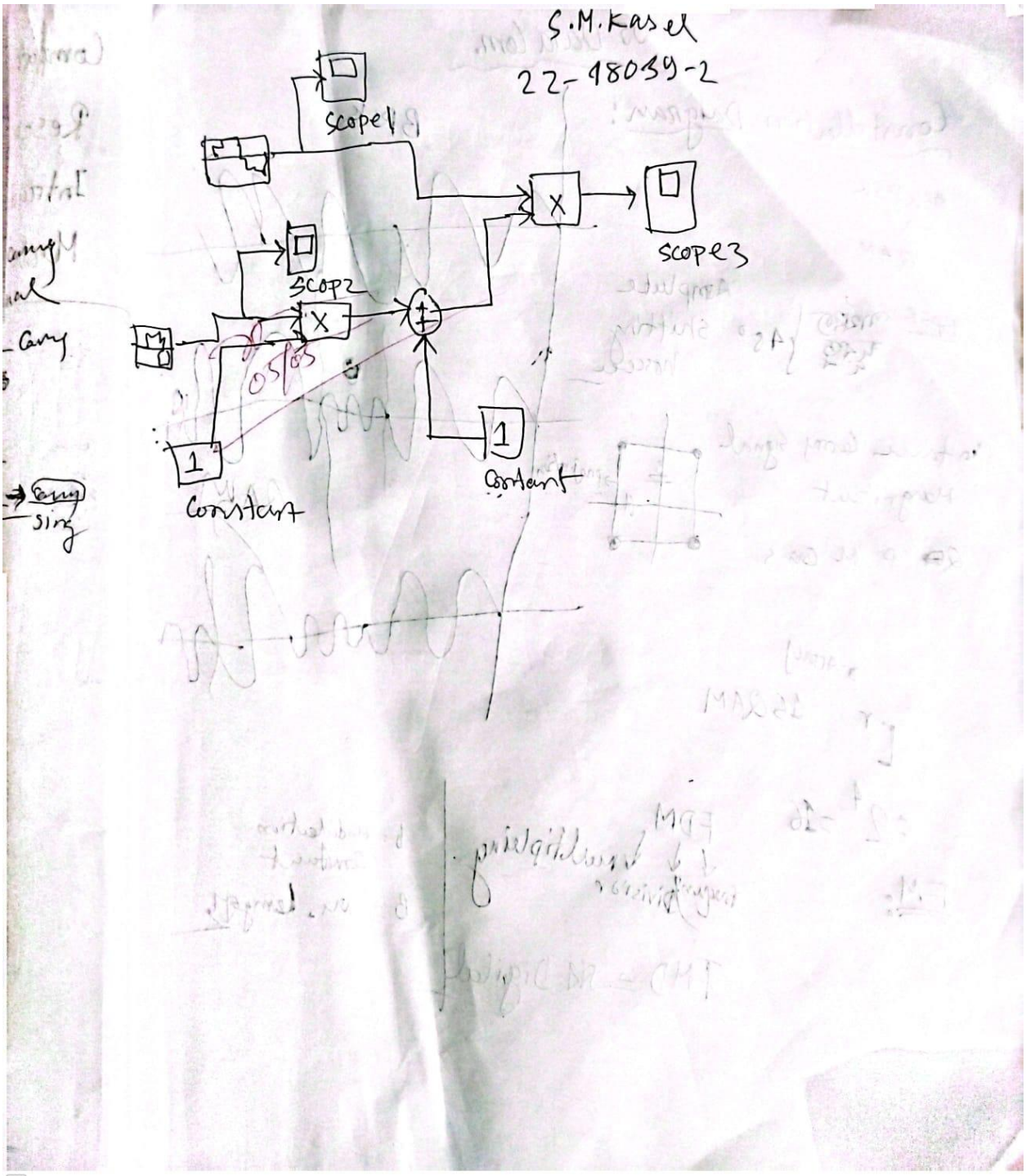








Data Sheet:



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Part-2

Title: study of frequency Modulation and Demodulation using Simulink (MATLAB)

Objective: This experiment is designed to understand the use of Simulink for Solving communication engineering problems. and also develop to understanding of frequency Modulation and Demodulation using Simulink.

Simulation Tools: MATLAB

Working principle:

Frequency Modulation:

1. Message signal controls the frequency of the carrier wave.
2. FM signal $s(t) = A_c \cos\left[2\pi f_c t + k_f \int m(t)\,dt\right]$

Frequency De-modulation:

1. PLL tracks phase and frequency of FM signal VCO
2. VCO adjusts to stay in phase input signal
3. Control Voltage of VCO gives recovered the message signal.

Performance Task:

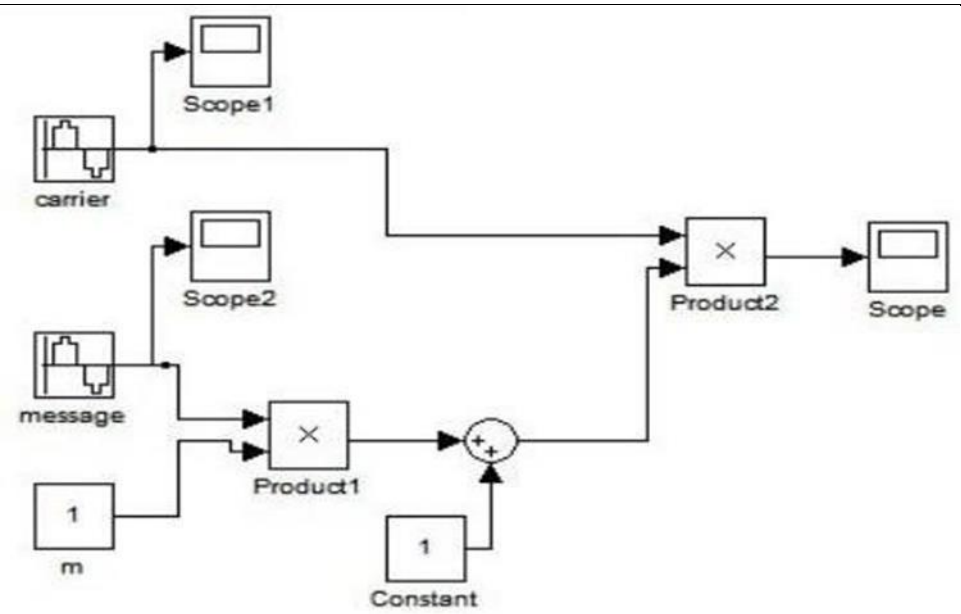

Fig 1: AM Generation using Simulink – Block Diagram

Fig 2: AM Generation using Simulink

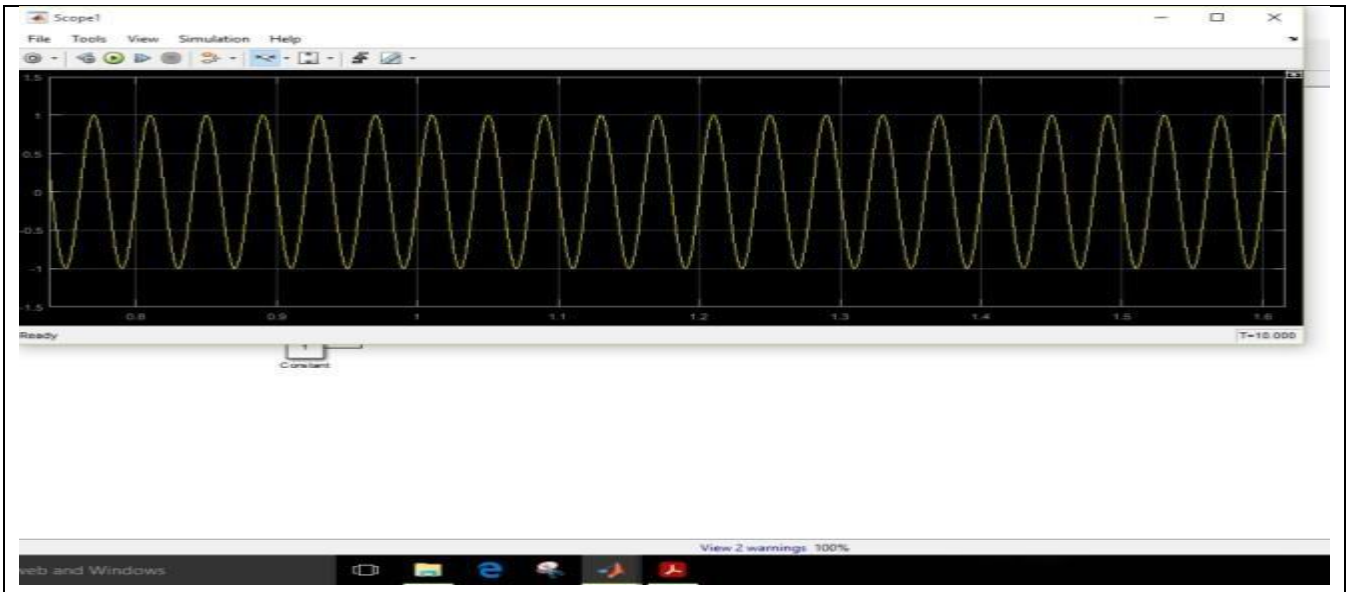

Fig 3: AM Generation using Simulink – Carrier Message Signal

Part-2

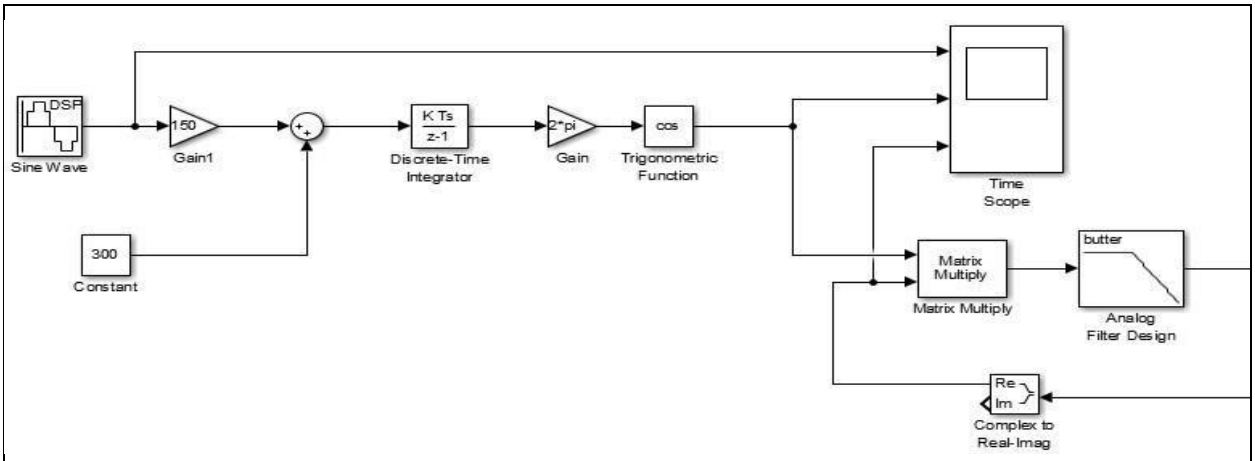

Figure 2: FM Modulator and Demodulator

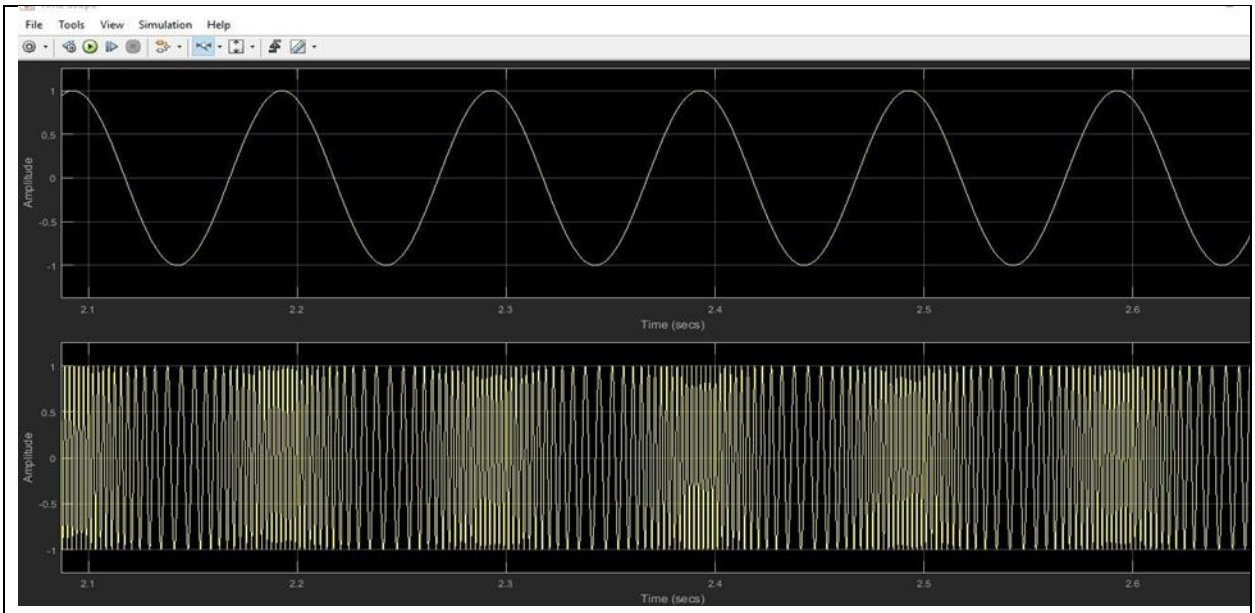

Figure 3: Time Scope

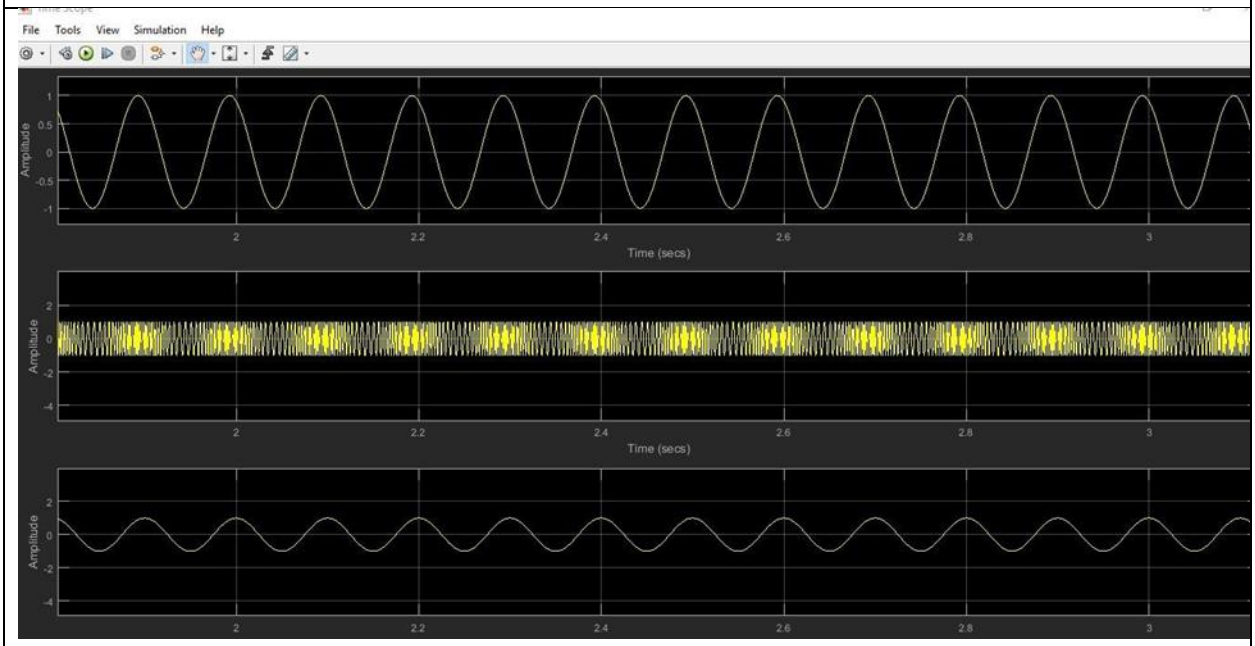

Figure 4: Time Scope for Model-1

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Discussion and Conclusion: In this experiment we implemented modulation and de-modulation using Simulink with the help of block diagram. We used sine signal blocks but converted them too cos signal by changing phase to 90 whe-ever needed. The block diagram we designed properly and Modulated signal was retrieved. Later, we used the modulated signal from the Modulation simulation & passed. So, we can say the goals of this experiment were successfully achieved.

Reference:

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2. William Stallings, "Data Computer & Com". person
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