

AMERICAN INTERNATIONAL UNIVERSITY BANGLADESH

Faculty of Engineering



Laboratory Report Cover Sheet

Students must complete all details except the faculty use part.

Please submit all reports to your subject supervisor or the office of the concerned faculty.

Laboratory Title: Study of Amplitude Modulator and Demodulator using Simulink
Number: 07 Submission Date: 29/03/2023 Semester: Spring 2022 – 2023 Subject
Code: COE 3201 Subject Name: Data Communication Section: K
Course Instructor: DR. SHUVRA MONDAL Degree Program: BSc CSE

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Group Number (if applicable): **01**



Individual Submission



Group Submission

No.	Student Name	Student ID	Contribution
1	SHEAKH, MOHAMMAD BIN AB. JALIL SHEAKH	20-42132-1	Performance Task (a) & (b)
2	AURTHY, MOST. LILUN NAHAR	20-43997-2	Abstract, Performance Task (a)
3	NISHAT, TARIKUL ISLAM	21-44632-1	Discussion, Conclusion, Performance Task (c)
4	MULLICK, IFTEKHAR UDDIN	21-44649-1	Performance Task (b) & (d)
5	ULLAH, MD ISMAIL JOBI	21-44747-1	Introduction, Performance Task (c)
6	ALANSAR, SADIAH	21-45612-3	

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Total Marks:

Marks Obtained:

Faculty comments

Title:

Study of Amplitude Modulator and Demodulator using Simulink

Abstract: This experiment is designed to:

1. To understand the use of Simulink for AM modulation.
2. To develop an understanding of AM demodulation.

Introduction:

Amplitude modulation (AM) is a one of the conventional techniques used to transmit message signals using a carrier wave. The amplitude or strength of the high-frequency carrier wave is modified in accordance with amplitude of the message signal.

- Carrier signal (S_c) = $A_c \sin(2\pi f_c t)$
- Message signal (S_m) = $A_m \sin(2\pi f_m t)$ # f_m must be smaller than f_c

When carrier amplitude is altered with respect to the message signal,

- Modulated Signal = $(A_c + A_m \sin(2\pi f_m t)) \sin(2\pi f_c t)$

In terms of modulation index ($m = A_m/A_c$) the equation becomes

- Modulated signal = $(1 + m \sin(2\pi f_m t)) A_c \sin(2\pi f_c t)$

Where,

- A_c = Carrier signal amplitude
- A_m = Message signal amplitude
- f_c = Carrier frequency
- f_m = Message frequency

Generating AM in Simulink

For generating AM we just have to implement the equation of AM in the block level.

Blocks Required Analyzing the equation we need,

1. Carrier Signal Source
2. Message Signal Source
3. Blocks for viewing the signals – Scope
4. Product Block
5. Summer Block
6. Constant Block

We can find these blocks in the following locations of Simulink Library...

Carrier, Message, Constant blocks

- Simulink → Sources → Sine wave
- Simulink → Sources → Constant

View Block

- Simulink → Sink → Scope

Product and Summer Block

- Simulink → Math Operations → Product
- Simulink → Math Operations → summer

Performance Task:

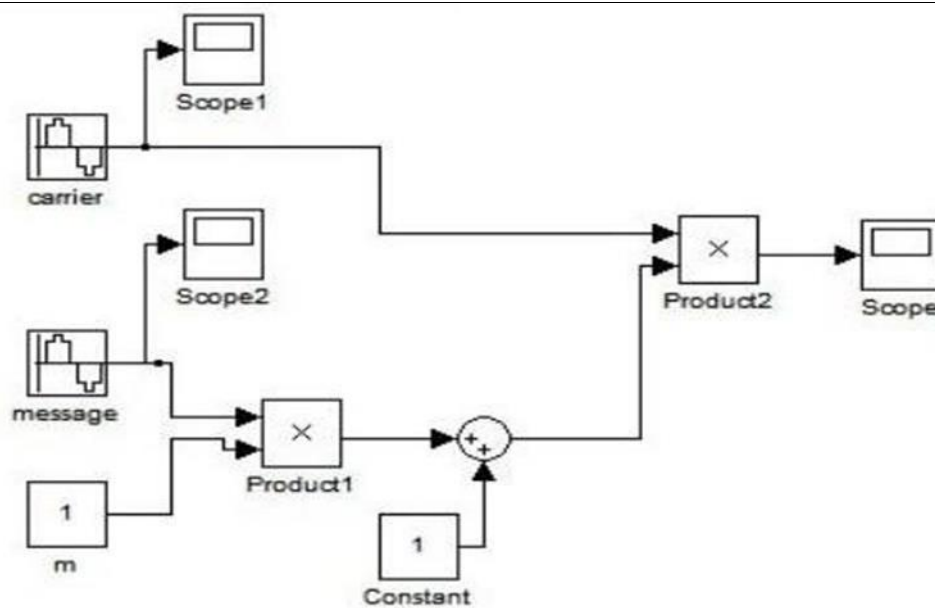


Fig 1: AM Generation using Simulink – Block Diagram

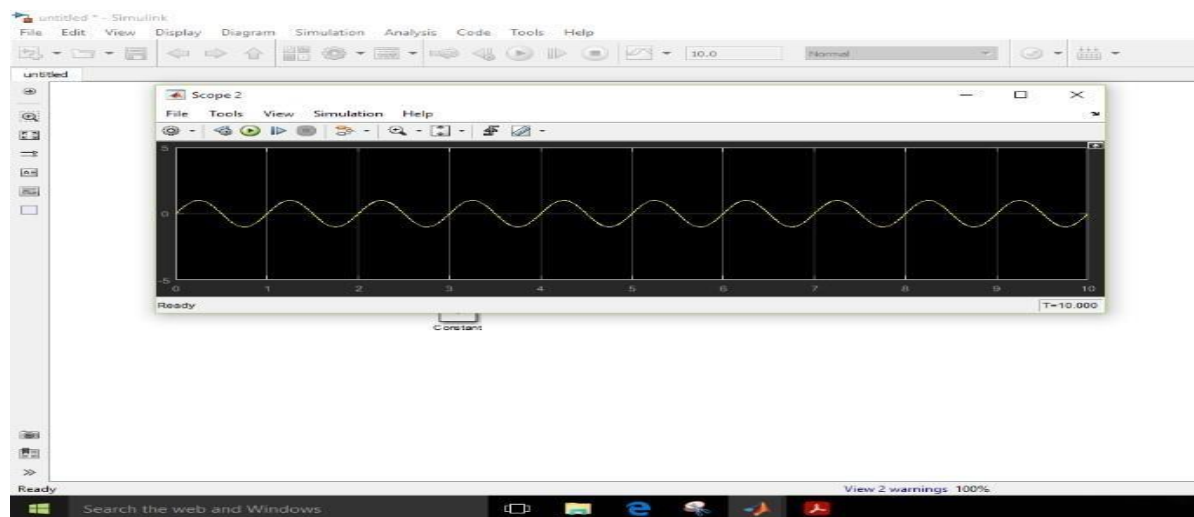


Fig 2: AM Generation using Simulink

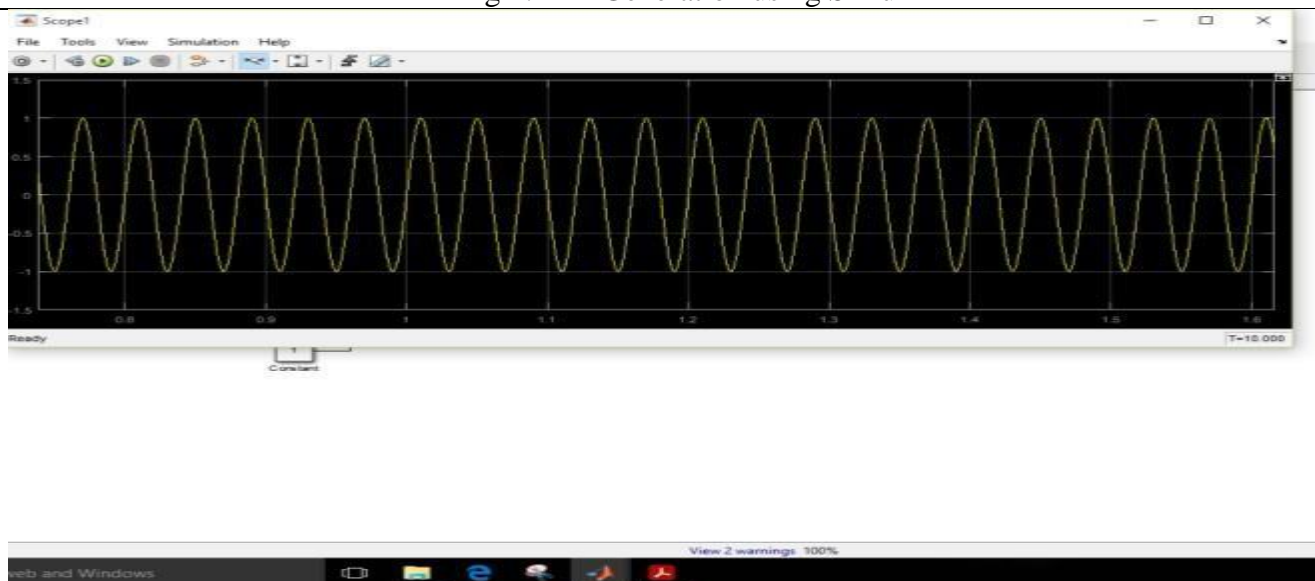


Fig 3: AM Generation using Simulink – Carrier Message Signal

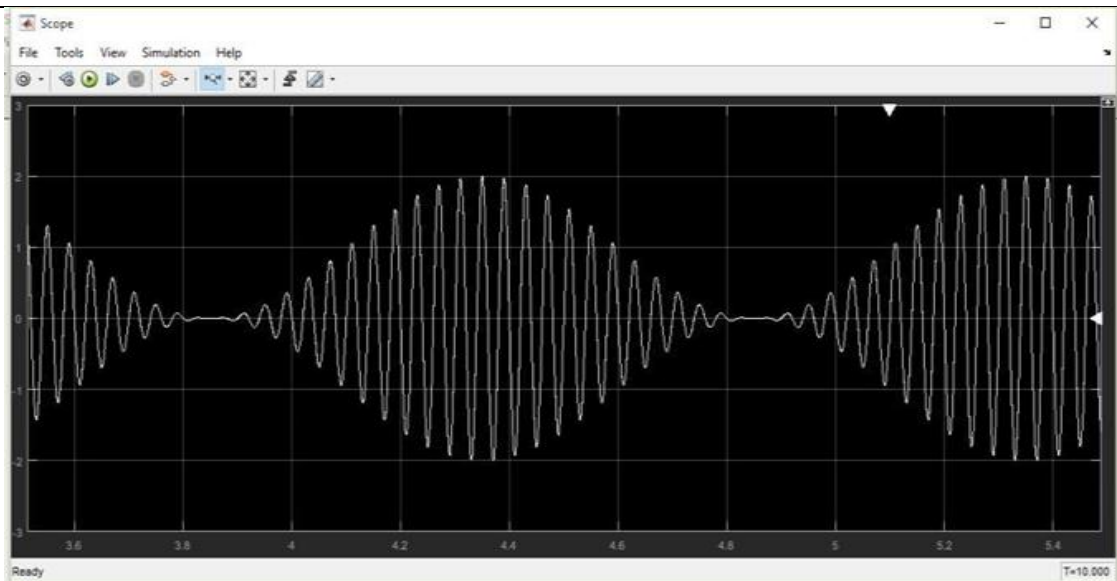


Fig 4: AM Generation using Simulink – Modulated Signal

Part-2

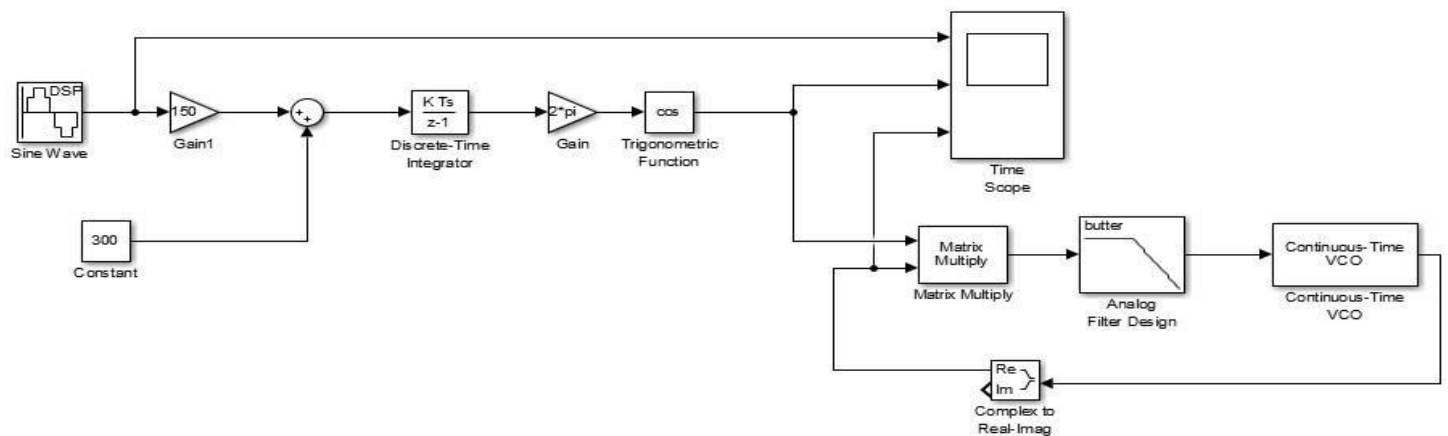


Figure 2: FM Modulator and Demodulator

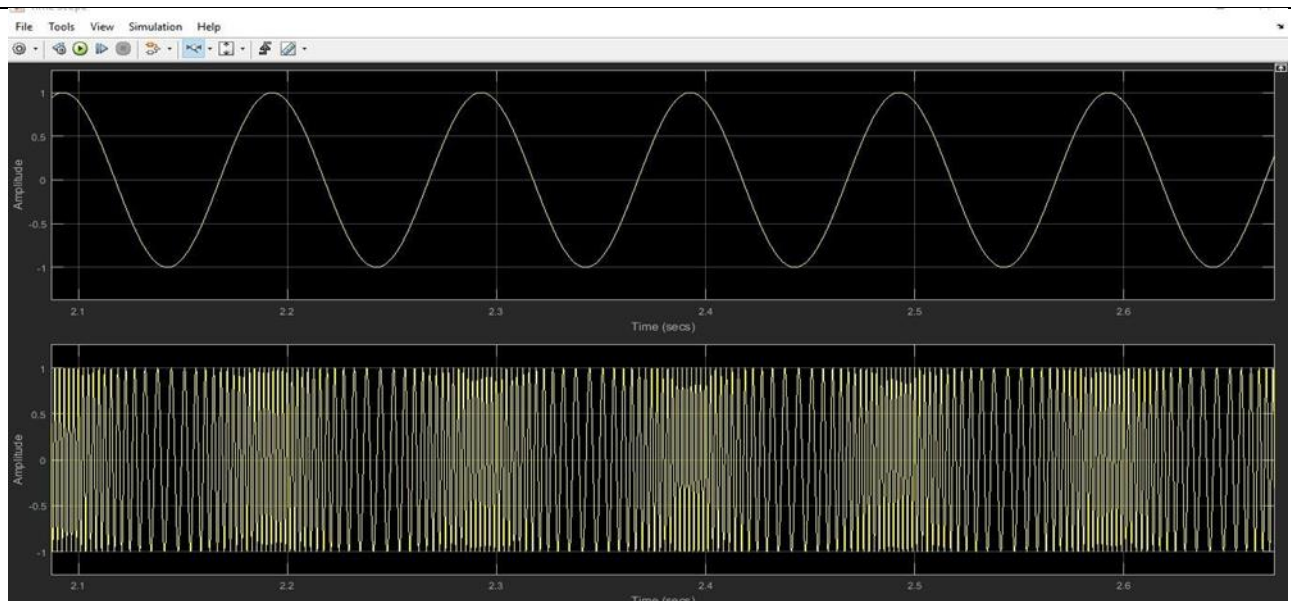


Figure 3: Time Scope

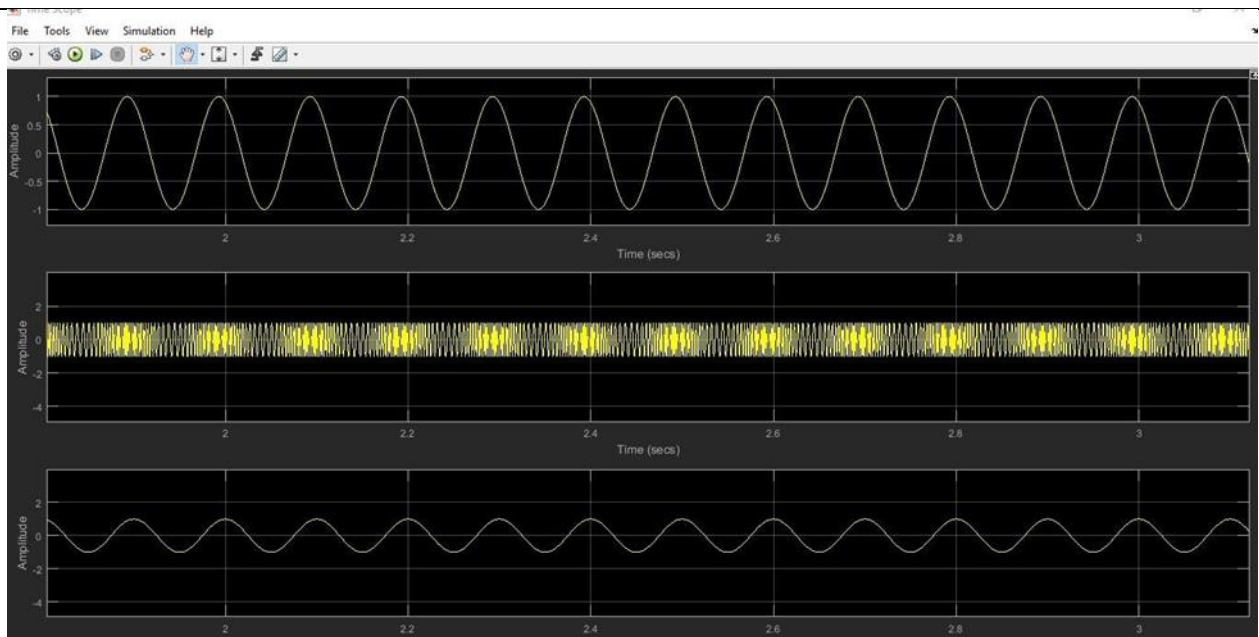


Figure 4: Time Scope for Model-1

Discussion and Conclusion:

In this experiment, we implemented modulation & demodulation using Simulink with the help of block diagrams. We used sine signal blocks but converted them too cos signal by changing phase to 90 wherever needed. The block diagrams were designed properly and modulated signal was retrieved. Later, we used the modulated signal from the modulation simulation & passed to through the transfer function twice to retrieve the original message signal through demodulation. So, we can say the goals of this experiment were successfully achieved.

References:

- Prakash C. Gupta, "Data communications", Prentice Hall India Pvt.
- William Stallings, "Data and Computer Communications", Pearson
- Forouzan, B. A. "Data Communication and Networking. Tata McGraw." (2005).
- AIUB Data Communication Engineering Lab Manual, Report 04