BIRZEIT UNIVERSITY

Faculty of Engineering & Technology Electrical & Computer Engineering Department

Communications Lab - ENEE4103

Pre-Lab #3

Experiment NO. 3: FM Experiment

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prelab 4		grade	out of
	m(t)	1	1
	ds/dt	1	1
Hand Solution	m'(t)	1	1
	modulation	1	1
block diagram	demodulation	1	1
	m(t)	0.5	0.5
	s(t)	0.5	0.5
	ds/dt	1	1
	m'(t) PLL	0	1
graphs/resluts	discussion	0	2
		7	10

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Section: 4

Date: 12-04-2023

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1. **Extract the message signal m(t).:**

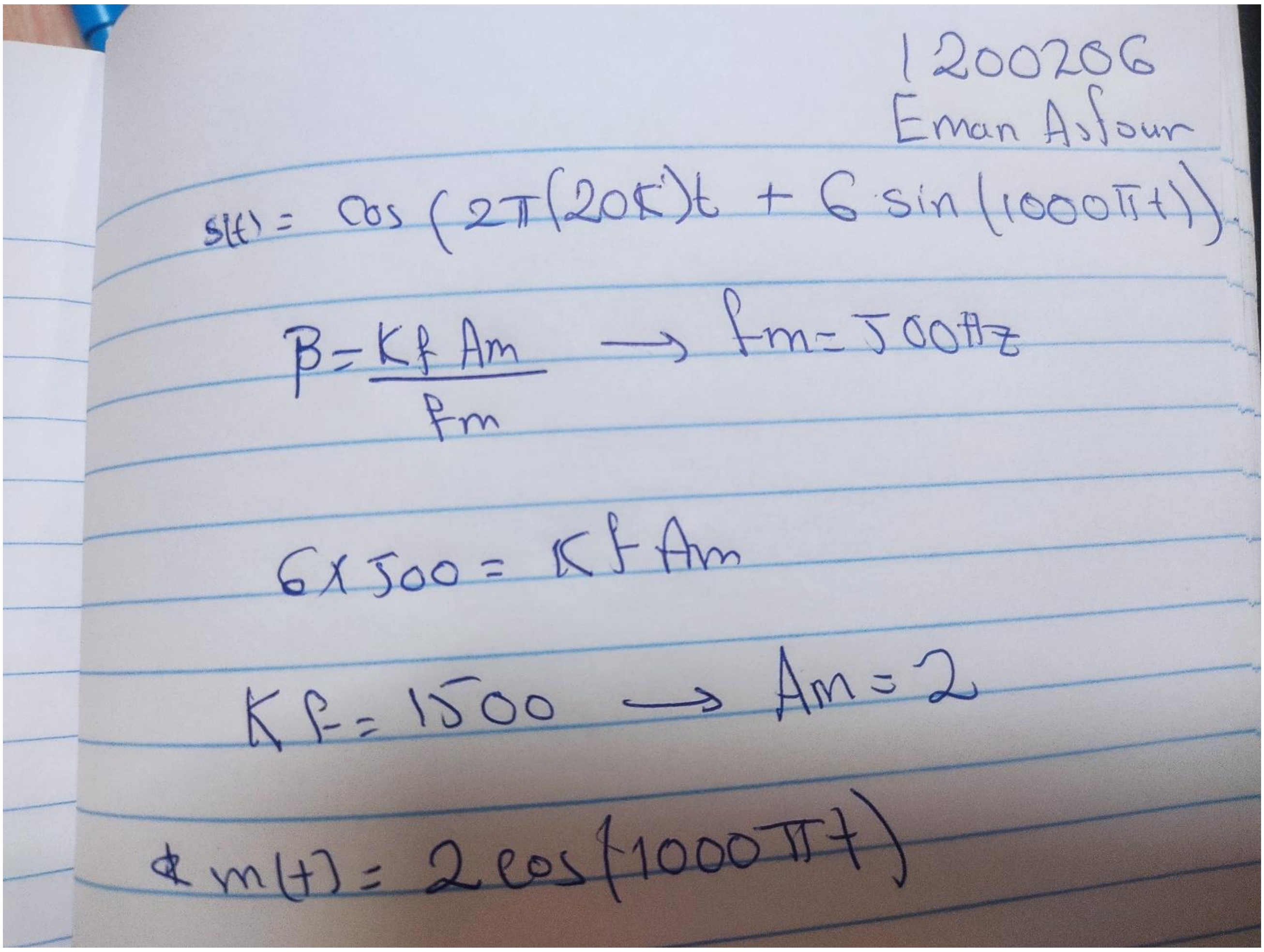


Figure 1.1: Extract Signal

2. Part 2: Plot message signal m(t) and s(t) versus t for -1 ≤ t ≤ 1

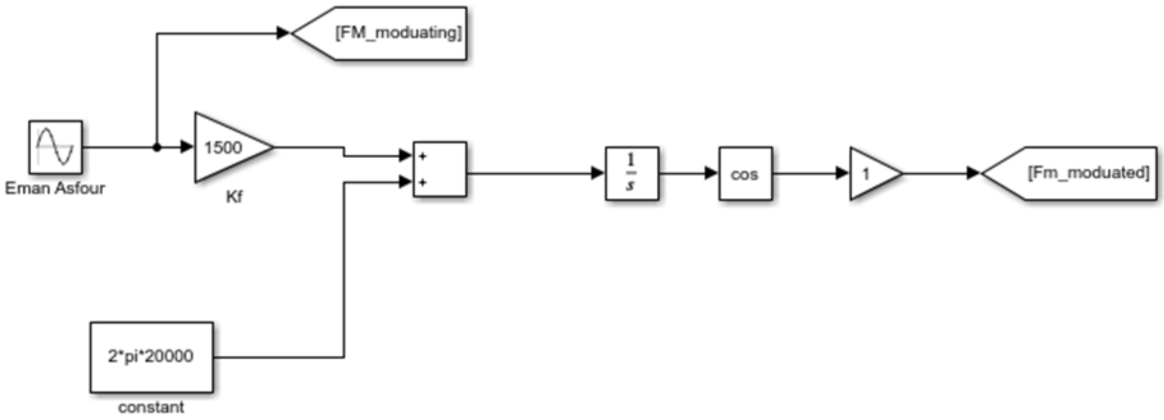


Figure 2.1: Modulated Signal

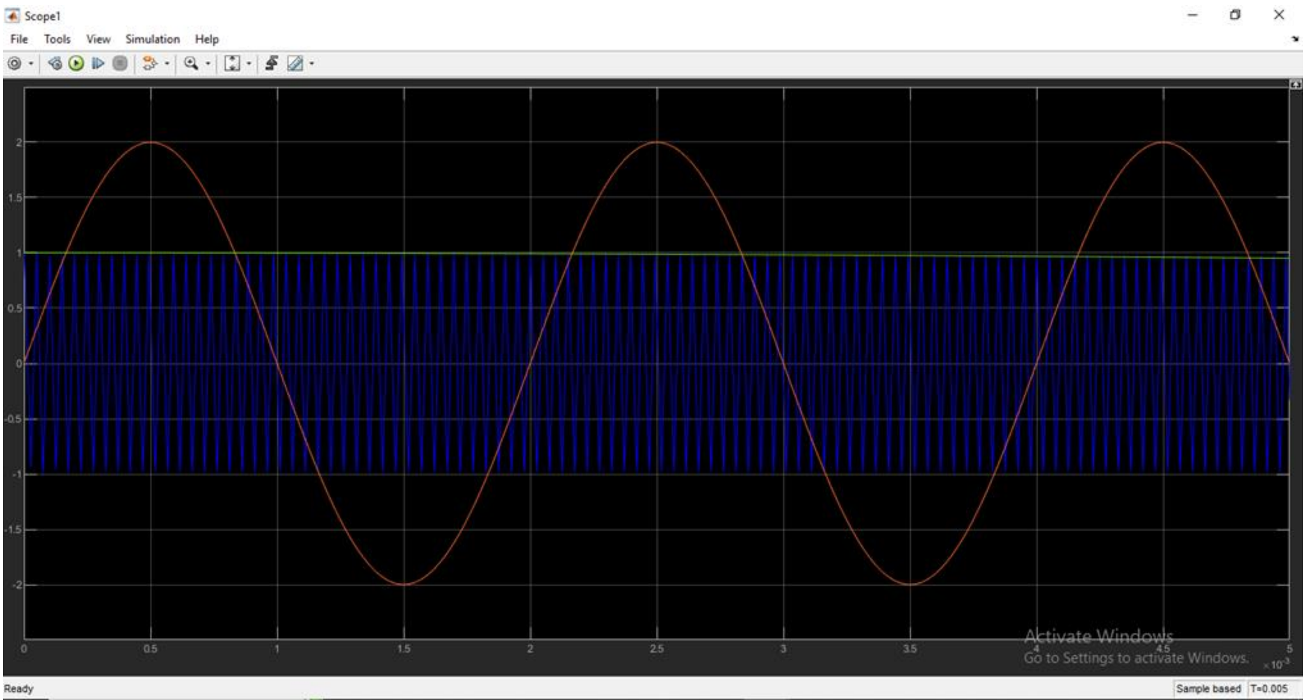


Figure 2.1: Modulated Signal Output

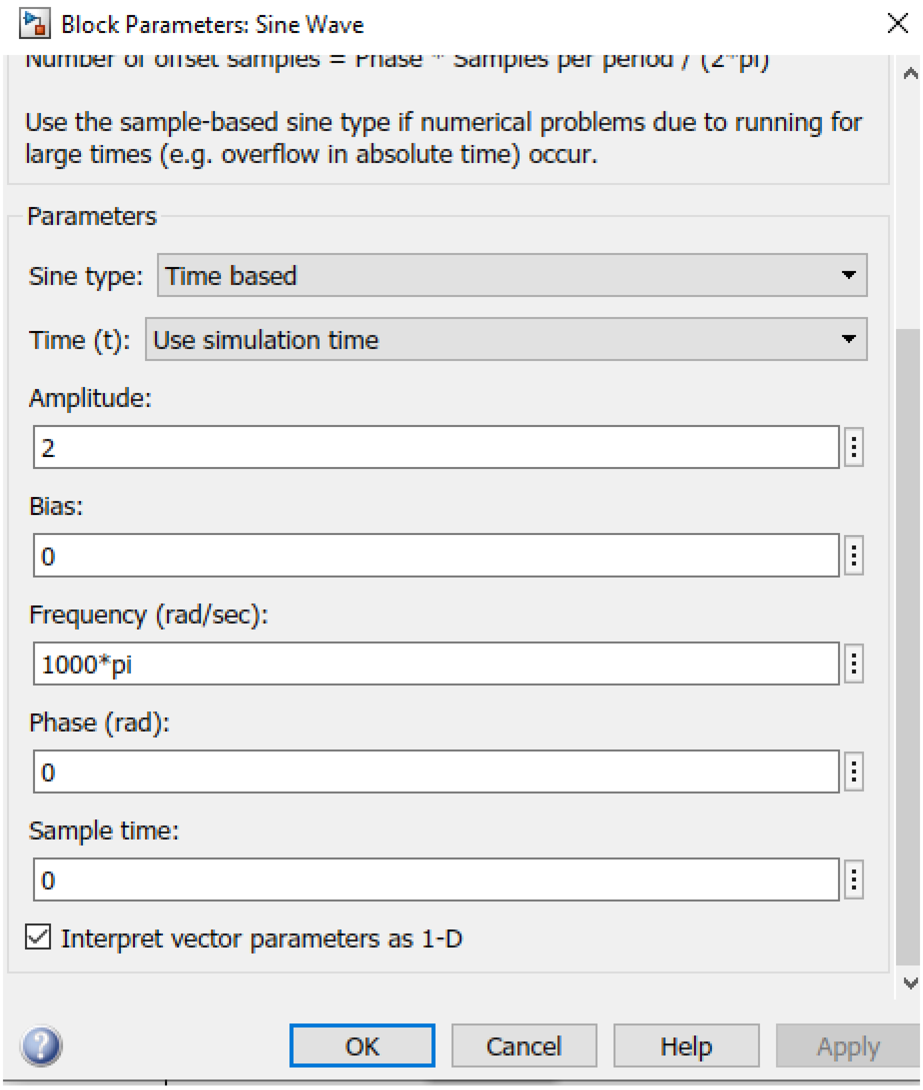


Figure 2.3: Message setting

Part 3: Differentiate s(t) with respect to t and plot ds(t)/dt for -1 ≤ t ≤ 1

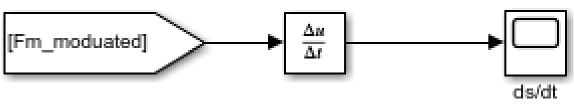


Figure 3.1: Differentiate signal

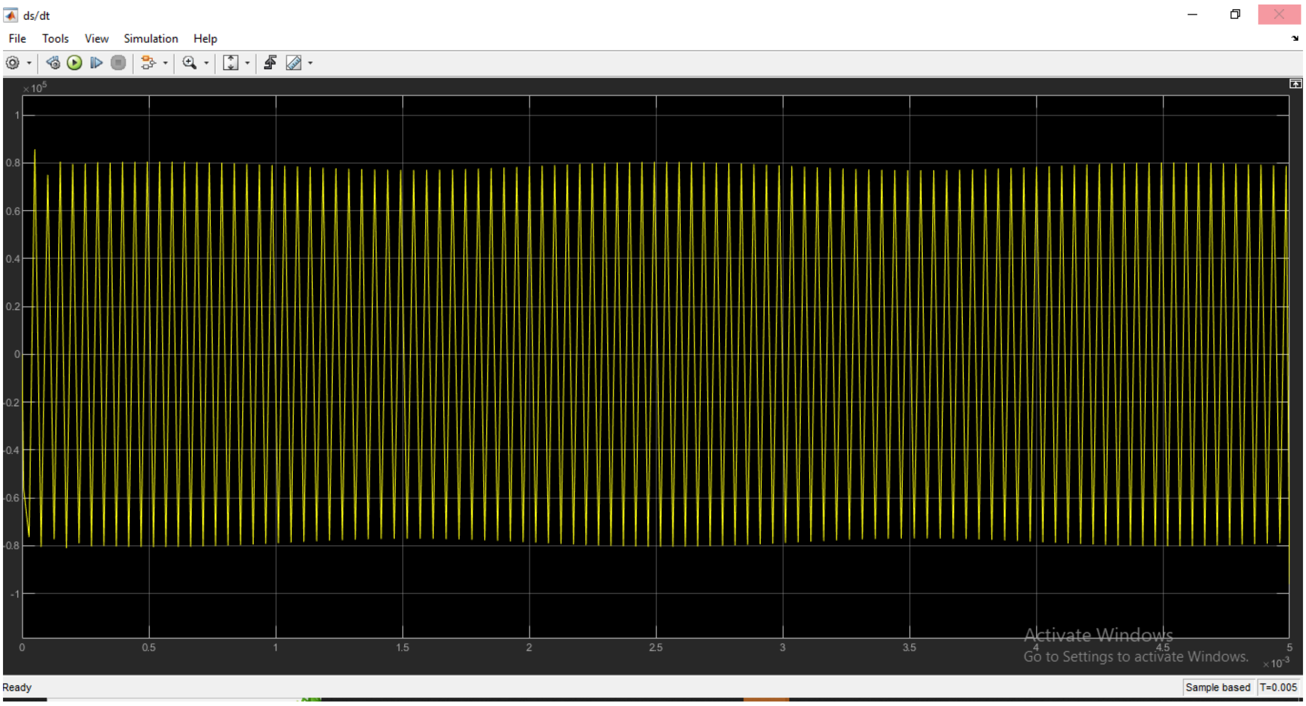


Figure 2.1: Differentiate signal Output

Part 4: Extract message signal by using phase-locked loop (PLL):

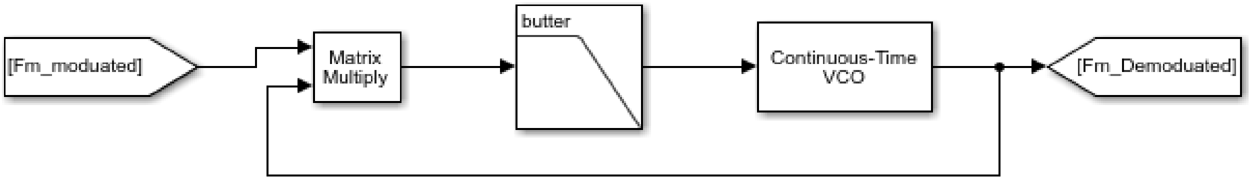
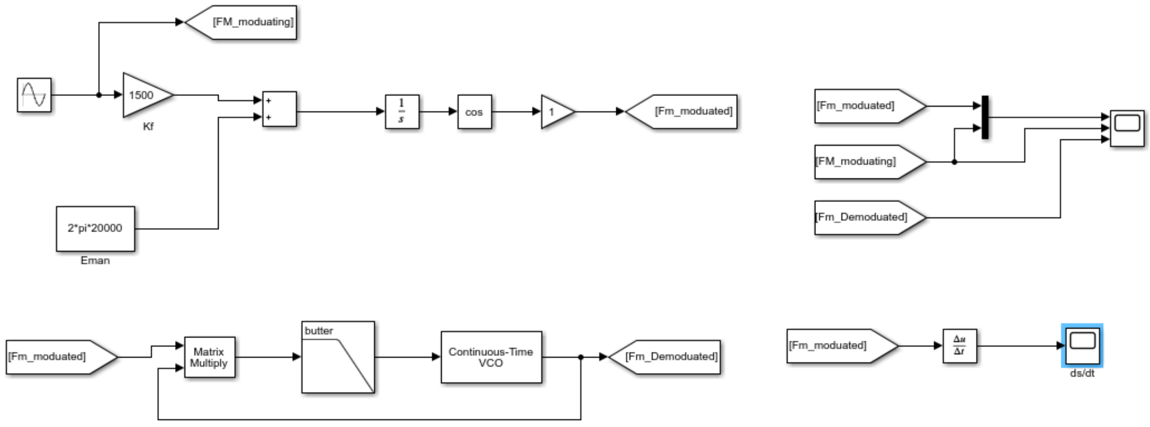
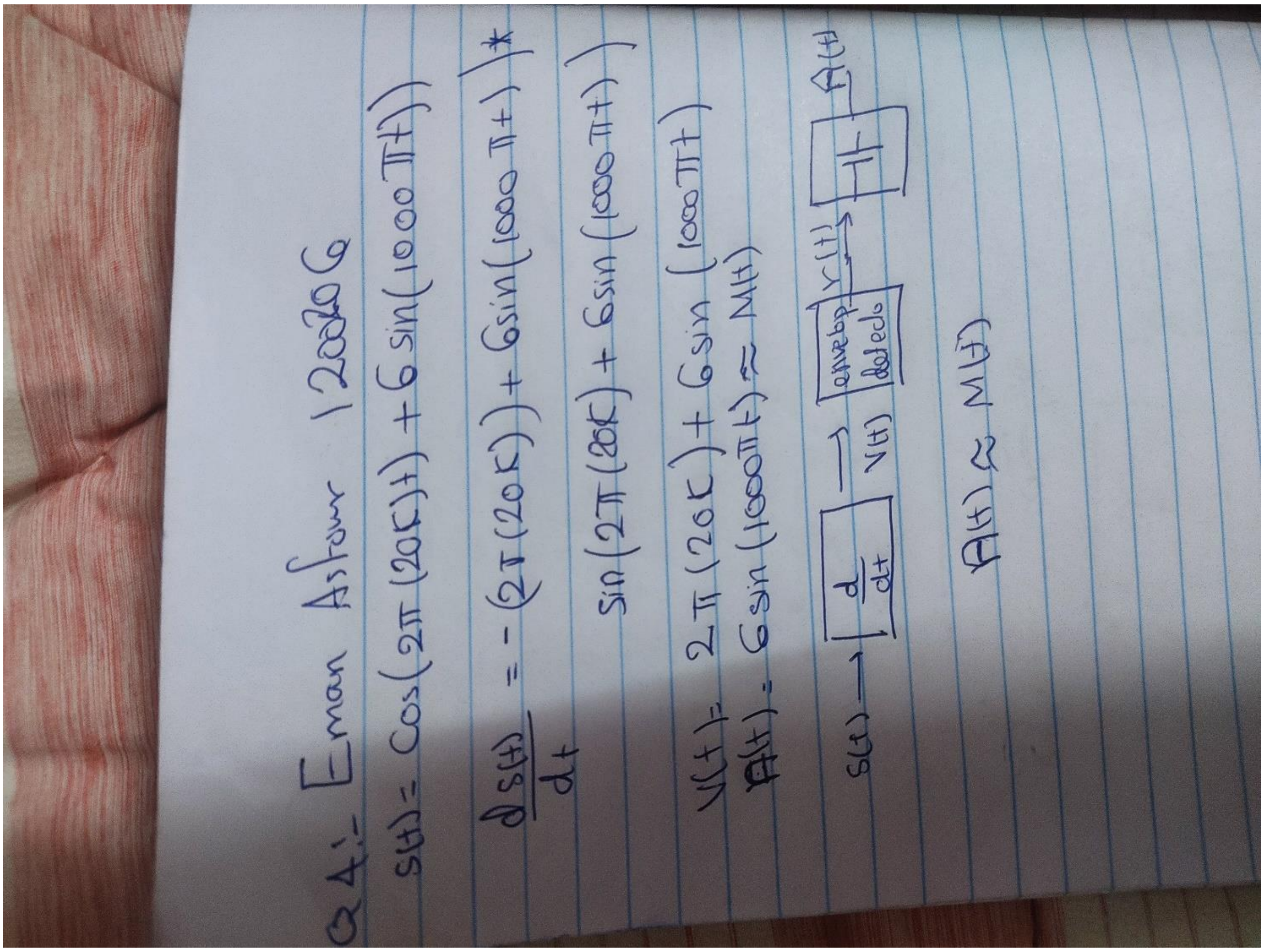


Figure 4.1: Block Diagram PLL



5-Apply ds(t)/dt to an ideal envelope detector, subtract the dc term and show that the detector's output is linearly proportional to m(t)



Q4:- Eman Asfour 1200206

$s(t) = \cos(2\pi(20K)t) + 6\sin(1000\pi t))$

$\frac{ds(t)}{dt} = -(2\pi(20K)) + 6\sin(1000\pi t))$ *

$\sin(2\pi(20K) + 6\sin(1000\pi t))$

$V(t) = 2\pi(20K) + 6\sin(1000\pi t)$

$m(t) = 6\sin(1000\pi t) \approx M(t)$

$s(t) \rightarrow \boxed{\frac{d}{dt}} \xrightarrow{V(t)} \boxed{\text{envelop detector}} \xrightarrow{y(t)} \boxed{\dashv\vdash} \rightarrow m(t)$

$m(t) \approx M(t)$

5.1:The Answer