2.6 OBSERVATION

DSB-SC MODULATION

Modulating signal				Carrier signal			
Signal Type	**Amplitude**	**Time Period**	**Frequency**	**Signal Type**	**Amplitude**	**Time Period**	**Frequency**
Sine wave	408mV	0.4ms	2.5kHz	Sine wave	2.6V	9.6μs	103.7kHz

Modulated Output			
Signal Type	**E_{max}**	**E_{min}**	**Modulation index**
AM	2.24 V	40 mV	0.887

DSB-SC DEMODULATION

Demodulated output			
Signal Type	**Amplitude**	**Time Period**	**Frequency**
Sine wave	1.22V	0.4ms	2.5kHz

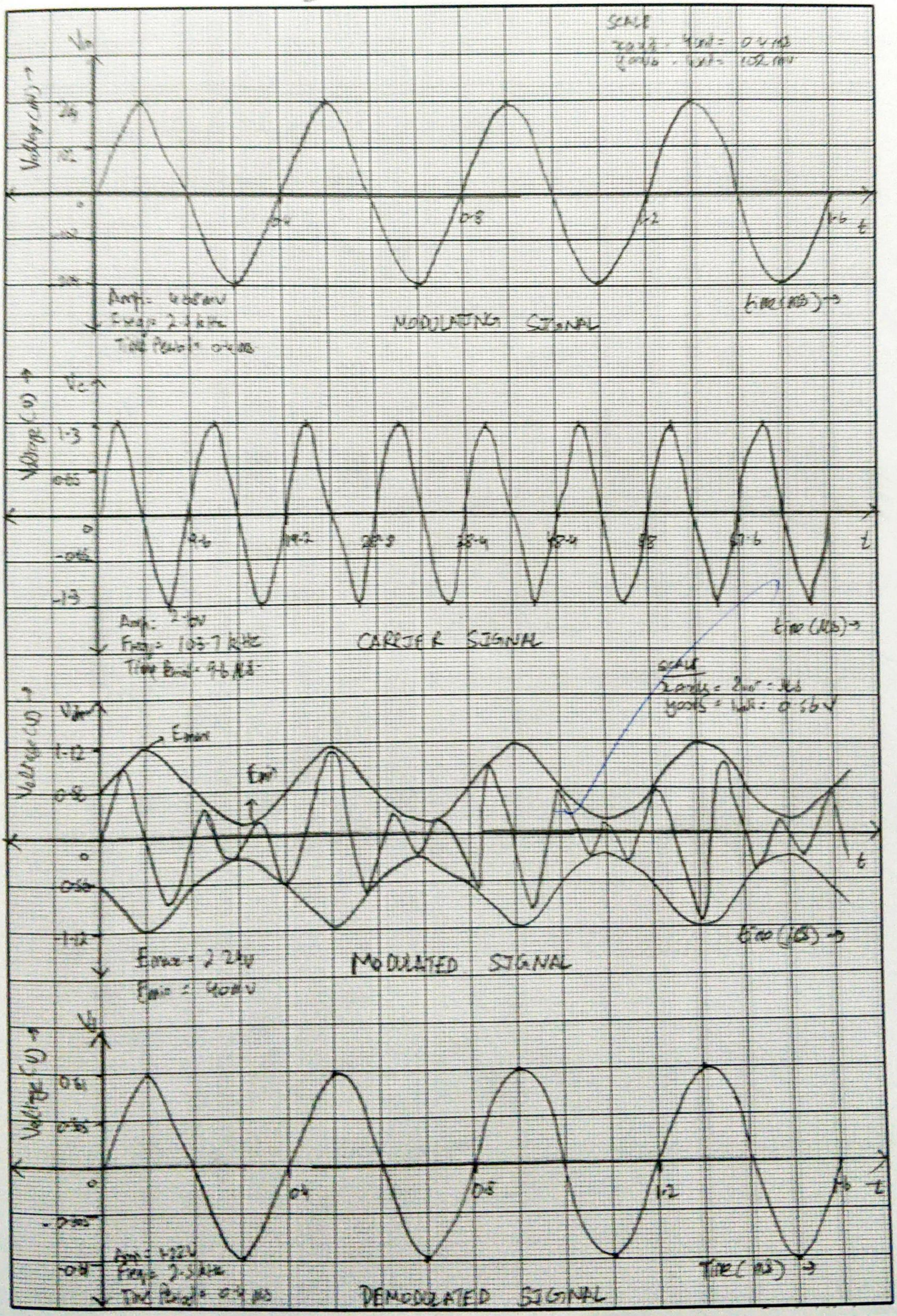
2.7 POST LAB QUESTIONS

1. Use SCILAB to produce DSBSC wave for a sinusoidal modulating signal of 1 KHz and carrier signal of 10 KHz.

2.8 LAB RESULT

Thus the DSB-SC modulation and demodulation was performed.

DSB-SC Modulation



Analog and Digital Communication Lab

Experiment 2: DSB-SC Modulation and Demodulation

I Pre-Lab Questions

1. What are the applications of DSBSC?

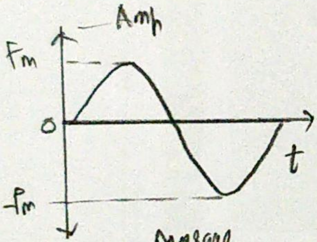
Soln. a) Television broad casting.

b) Phase Shift Keying method.

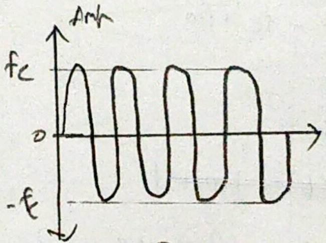
c) Used in wireless Communication and two way FM.

2. Draw the Spectrum of DSB-SC AM Signal in which the modulating Signal $E_m \cos \omega_m t$ modulates a carrier Signal $F_c \cos \omega_c t$.

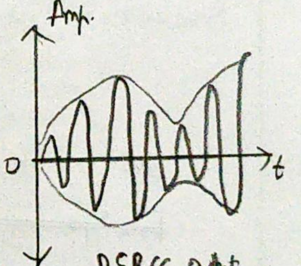
Soln.



Message



Carrier



DSBSC output

3. What is the percentage of power saving for DSB SC when Compared with AM having 100% depth of modulation?

Soln. Considering 100% depth of modulation, the percentage of power saving for DSB SC is 66.66% as Compared to AM.

4. A DSB-SC Signal is generated using the Carrier Signal $\cos(\omega_c t + \theta)$ and modulating Signal $m(t)$. What is the envelope detector output of this DSB-SC Signal.

Soln.

$c(t) = \cos(\omega_c t + \theta)$

Modulating Signal $= M(t)$

DSB-SC output $= m(t)\, c(t)$

$c(t) = m(t) \cos(\omega_c t + \theta)$

$c(t) \propto M(t) \cos(\omega_c t + \theta)$

Envelope of $c(t) = |m(t)|$

5 A 4 GHz carrier is DSB-SC modulated by a low pass signal with a maximum frequency of 2 MHz. Determine minimum frequency of the sampling impulse train.

Soln. $f_c = 4GHz$

$f_m = 2MHz$

$USB = f_c + f_m$

$LSB = f_c - f_m$

Bandwidth $= USB - LSB$

$= f_c + f_m - f_c + f_m$

$= 2f_m$

$BW = 4MHz$

~~Envelope of $c(t) = |m(t)|$~~

Minimum sampling frequency $= 2 \times BW$

$= 8MHz$