

## Homework #5

## Amplitude Modulation

Total Points 100

Reading Assignment: Chapters 4 and Related Course Notes

Assigned: Monday February 27, 2006

Due: Monday March 6, 2006

**Problem 1: (25 points)**

Consider the message signal

$$m(t) = 2 \cos(2\pi f_1 t) + \cos(2\pi f_2 t)$$

used to modulate the carrier  $10 \cos(2\pi f_c t)$  to generate a double sideband suppressed carrier (DSB-SC) AM signal  $s_{dsb}(t)$ .

- Write an expression for  $s_{dsb}(t)$  and sketch its spectrum
- What fraction of the total signal power is contained in the sidelobes
- What is the Modulation Index

**Problem 2: (25 points)**

Problem 4.5-1

**Problem 3: (25 points)**

Problem 4.5-3

**Problem 4: (25 points)**

A double sideband suppressed carrier AM signal is modulated by the signal

$$m(t) = 2 \cos(2000\pi t) + \cos(6000\pi t)$$

The modulated signal is

$$S_{dsb}(t) = 100m(t) \cos(2\pi f_c t)$$

where  $f_c = 1$  MHz.

- Determine and sketch the spectrum of  $s_{dsb}(t)$ .
- Determine the average power in the frequency components.