

King Saud University  
College of Engineering  
Electrical Engineering Department

EE320

HW # 4

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**Q1)** If the signal  $x(t)$  has a Fourier transform as

$$X(f) = AT \sin(2\pi fT)/(2\pi fT)$$

- a) Plot the signal  $x(t)$ .
- b) Find the energy  $E$  contained in  $x(t)$ .

**Q2)** The modulating signal  $m(t)$  has the form

$$m(t) = 2 \cos(2000\pi t) \cos(4000\pi t)$$

This signal is modulated by a carrier of frequency  $f_c = 40 \text{ kHz}$  and amplitude  $A_c = 10 \text{ volts}$ , where  $k_a = 0.1$ .

- a) Find and Plot the spectrum of  $m(t)$ , then find its bandwidth.
- b) Write the mathematical expression  $s(t)$  of AM and DSB-SC.
- c) Plot the spectrum of AM and DSB-SC.
- d) What is the bandwidth of AM & DSB-SC.
- e) What is the components of the output if AM are passing through a band pass filter of center frequency =  $42 \text{ kHz}$ , and bandwidth of  $3 \text{ kHz}$ .