MERU UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND ARCHITECTURE

DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

BACHELOR OF TECHNOLOGY IN ELECTRICAL AND ELECTRONICS ENGINEERING

PRE_LAB REPORT

EET 3351: COMMUNICATION SYSTEMS

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Communication systems

Pre Lab exercises

Q1. Plot the magnitude of the following waves in frequency domain.

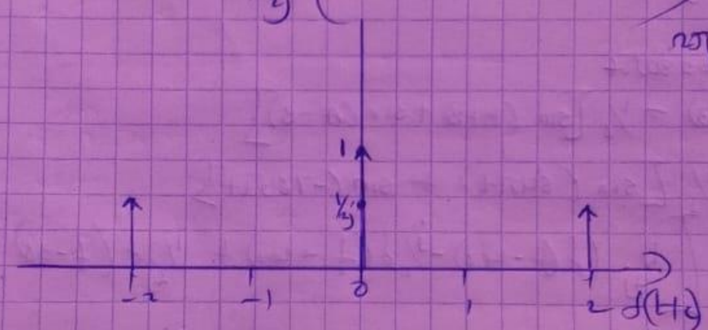
a) $1 + \sin(4\pi t)$

b) $A_c[1 + \sin(4\pi t)]\cos(80\pi t)$ where A_c is a positive number.

a) DC Component : 1 produces impulse at $f=0$

$\sin(4\pi t) = \frac{1}{2j}\left(e^{j4\pi t} - e^{-j4\pi t}\right)$

$2\pi f$ $f = \frac{4\pi}{2\pi} = 2$

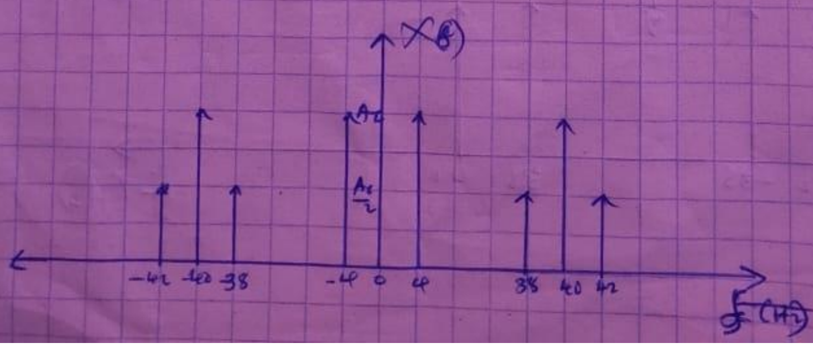


b) $x(t) = A_c\cos(80\pi t) + A_c\sin(4\pi t)\cos(80\pi t)$

$\sin(4\pi t)\cos(80\pi t) = \frac{1}{2}[\sin(84\pi t) + \sin(76\pi t)]$

Impulse at $f = \pm 4$ magnitude A_c

Impulse at $f = \pm 38, \pm 42$. magnitude $A_c/2$ for side bands



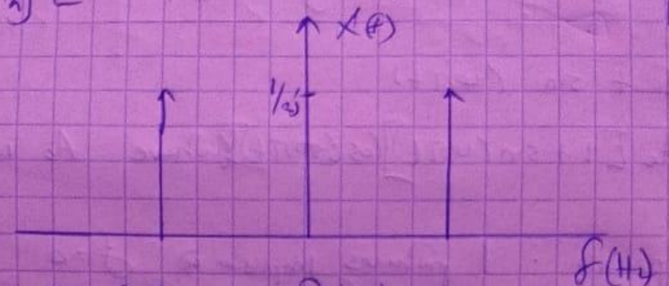
Q_2 a) The message signal $m(t) = \sin(6\pi t)$

a) Plot $|M(f)|$ by hand

$f = 2Hz$

$\sin(2\pi t$

$= \frac{1}{2j}\left[\delta(f-2) - \delta(f+2)\right.$



b) If this message is DSB-AM modulated on a carrier $\cos(80\pi t)$, find the corresponding passband modulated signal $S(t)$ and plot $(S(f))$ by hand

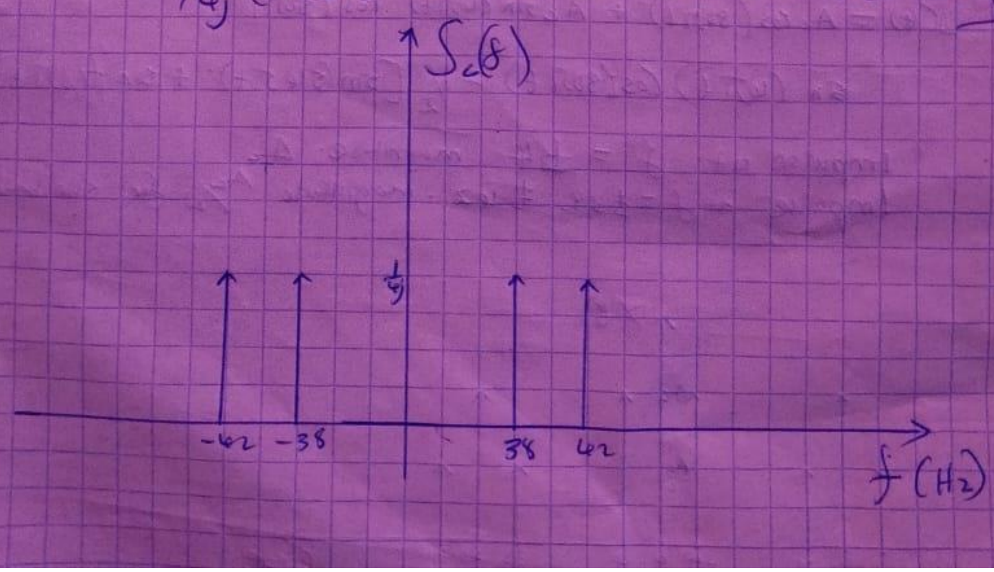
$S(t) = m(t)\cos 80\pi t$

$\sin(A)\cos(B) = \frac{1}{2}\left[\sin(A+B) + \sin(A-B)\right]$

$S_c = \frac{1}{2}\left[\sin(84\pi t) + \sin(-76\pi t)\right]$

$S(f) = \frac{1}{2}\left[\frac{1}{2j}(\delta(f-42) - \frac{1}{2}\delta(f+42) + \frac{1}{2j}\delta(f-38) - \frac{1}{2j}\delta(f+38)\right]$

$= \frac{1}{4j}\left(\delta(f-42) - \delta(f+42) + \delta(f-38) - \delta(f+38)\right]$



c) The received signal $S_c(t)$ enters the demodulator. The demodulator mixes it down to baseband and applies an LPF.

output: $$S_2(t) = A_c[1 + \sin(6\pi t)]$$

$$y(t) = A_c \sin(6\pi t).$$