Experiment - 1

Aim :- To study Sampling Theorem.

Software Used :-

Theory :-

Basic Plotting commands :-

plot :- It generates xy plot.

subplot :- It creates plots in subwindows.

xlabel :- It adds text-label to x-axis.

ylabel :- It adds text-label to y-axis.

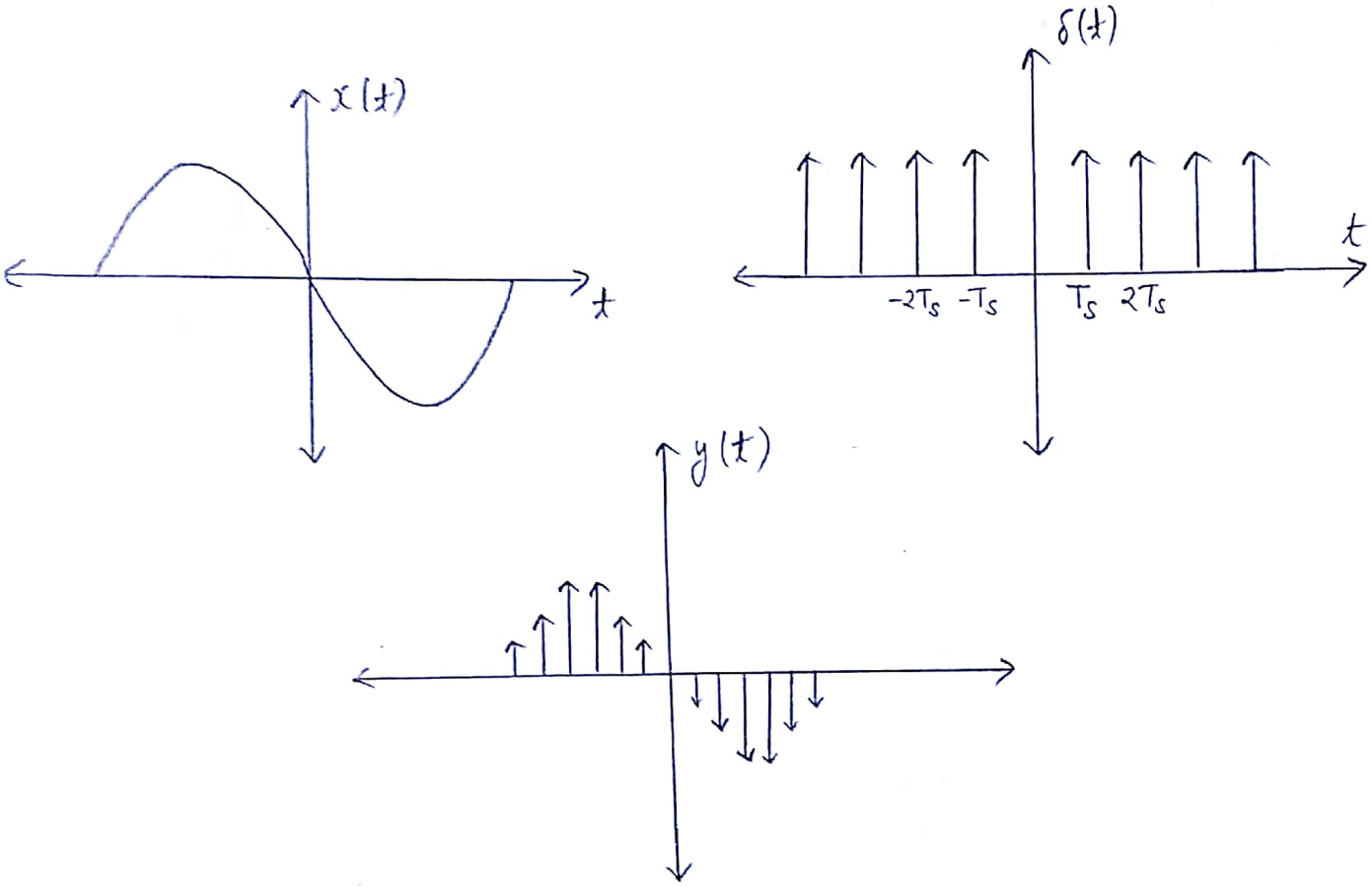
title :- It puts text at top of plot.

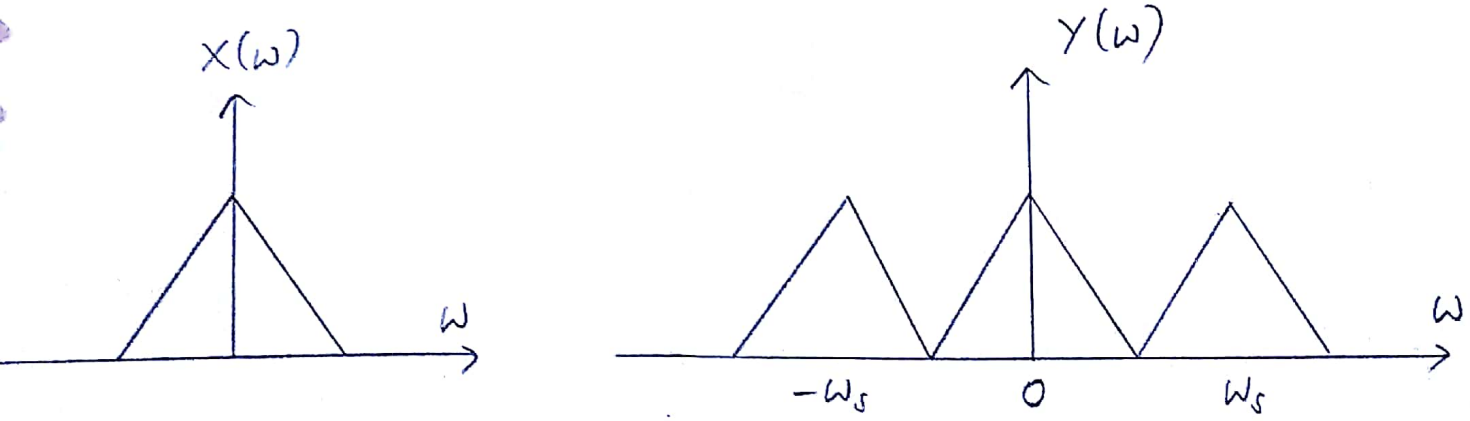
stem :- It creates stem plot.

hold :- It freezes current plot.

grid :- It displays gridlines.

figure :- It opens a new figure window.





Sampling-

Sampling :- A continuous time signal can be represented in its samples and can be recovered back when sampling frequency f_s is greater than or equal to the twice the highest frequency component of message signal i.e.,

$$f_s \geq 2 f_m$$

where f_s is sampling frequency,
f_m is message signal frequency

Aliasing Effect :- It is an effect that causes different signals to become indistinguishable from each other during sampling.

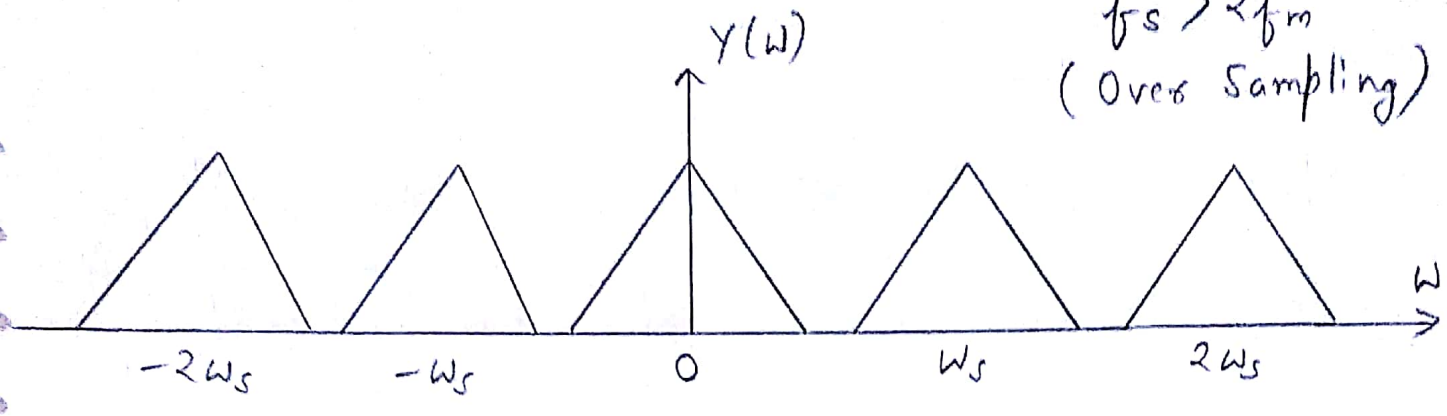
Under Sampling :- Sampling with a sampling frequency low enough to cause aliasing (less than the twice of message signal frequency) is known as under-sampling.

$$f_s < 2 f_m \quad \text{(Under Sampling)}$$

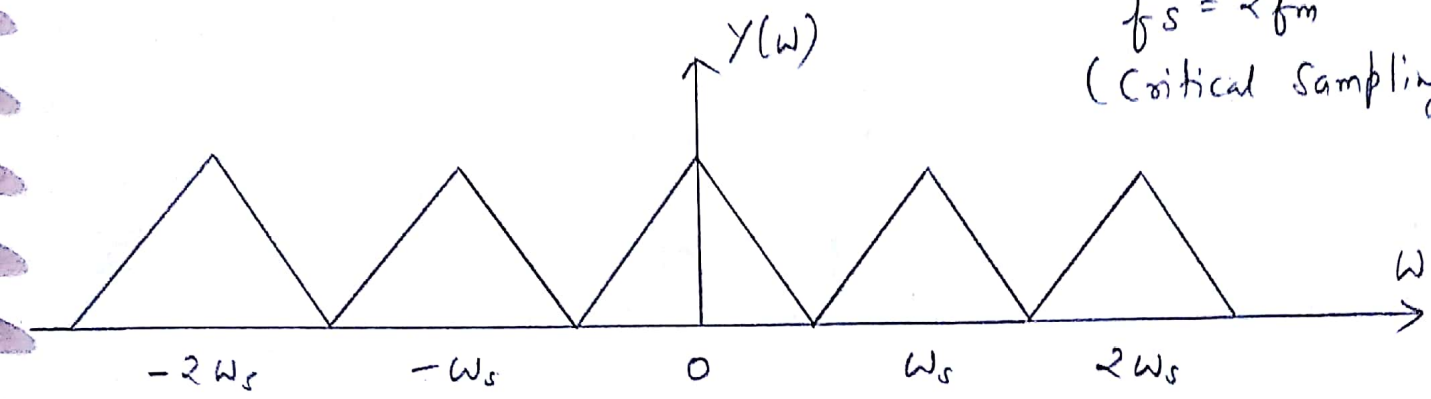
Over Sampling :- It is the process of sampling a signal with a sampling frequency greater than the twice of message signal frequency.

$$f_s > 2 f_m \quad \text{(Over Sampling)}$$

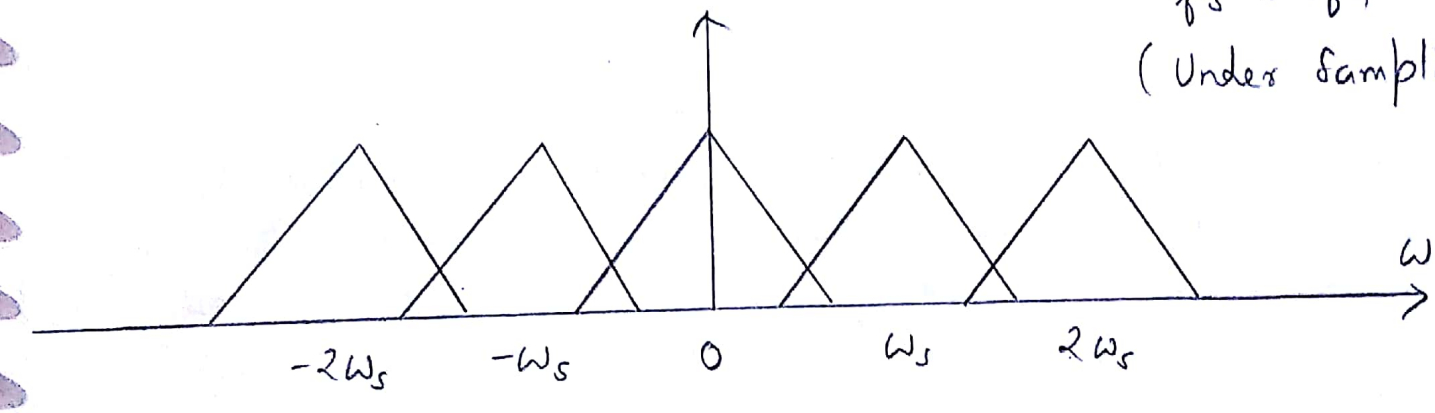
$f_s > 2f_m$
(Over Sampling)



$f_s = 2f_m$
(Critical sampling)



$f_s < 2f_m$
(Under sampling)



Critical Sampling :- Process of sampling a signal with a sampling frequency equal to the twice of the message signal frequency i.e;

$$f_s = 2 f_m \quad \text{(Critical Sampling)}$$