(2) SAMPLING (USING MULTISIM)

1. OBJECTIVES

Experiment the theory of sampling and reconstruction in Multisim.

2. SAMPLING USING MULTIPLIER

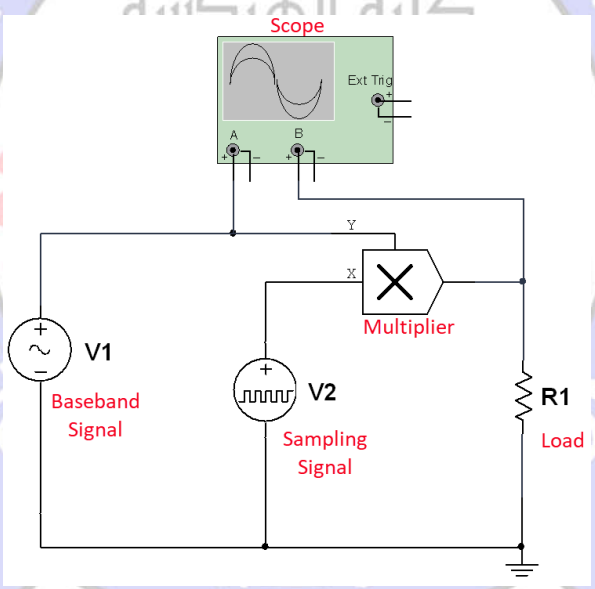
(1) Design and implement the following simple sampling circuit in Multisim.

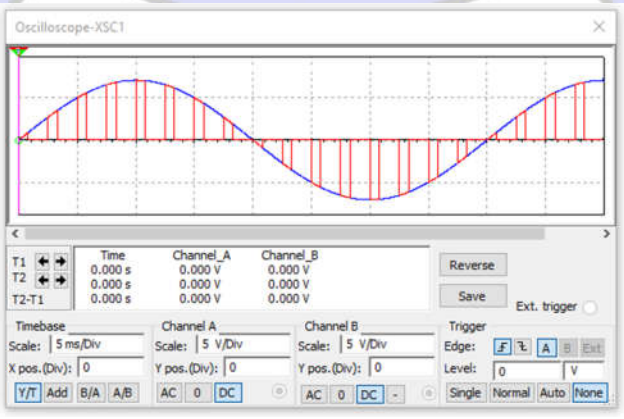
(2) Set the baseband signal V_1 to be a sine wave with $V_{\text{rms}} = 5\text{V}$ and the frequency is $f_m = 25\text{Hz}$.

(3) Set the sampling signal V_2 to be a unipolar square wave with $V_{\text{ON}} = 1\,\text{V}$, the frequency is $f_S = 400\text{Hz}$ and the duty cycle is $D = 32\%$.

(4) Study the generated output.

(5) Examine the output for different values for the given parameters above.





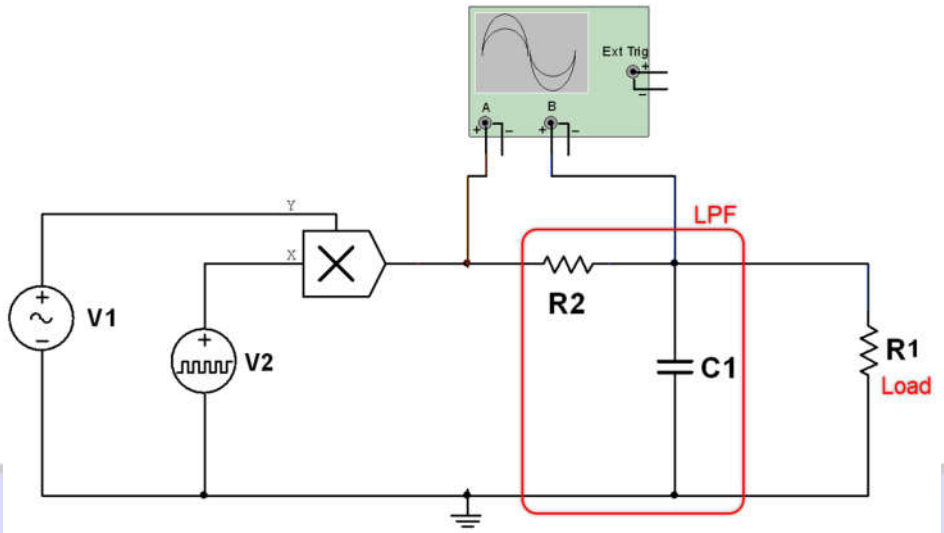
3. RECONSTRUCTION PROCEDURE

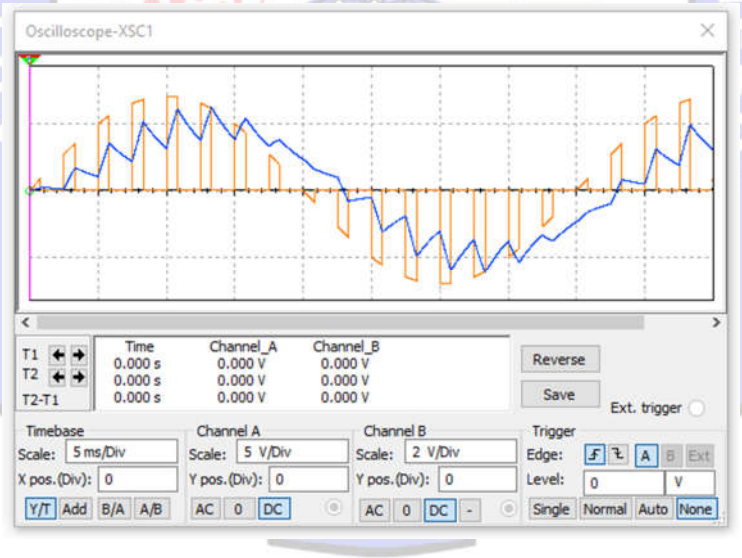
(1) Apply the output of the previous circuit to a simple passive LPF (RC circuit).

(2) Estimate appropriate values for the R and C to achieve the reconstruction.

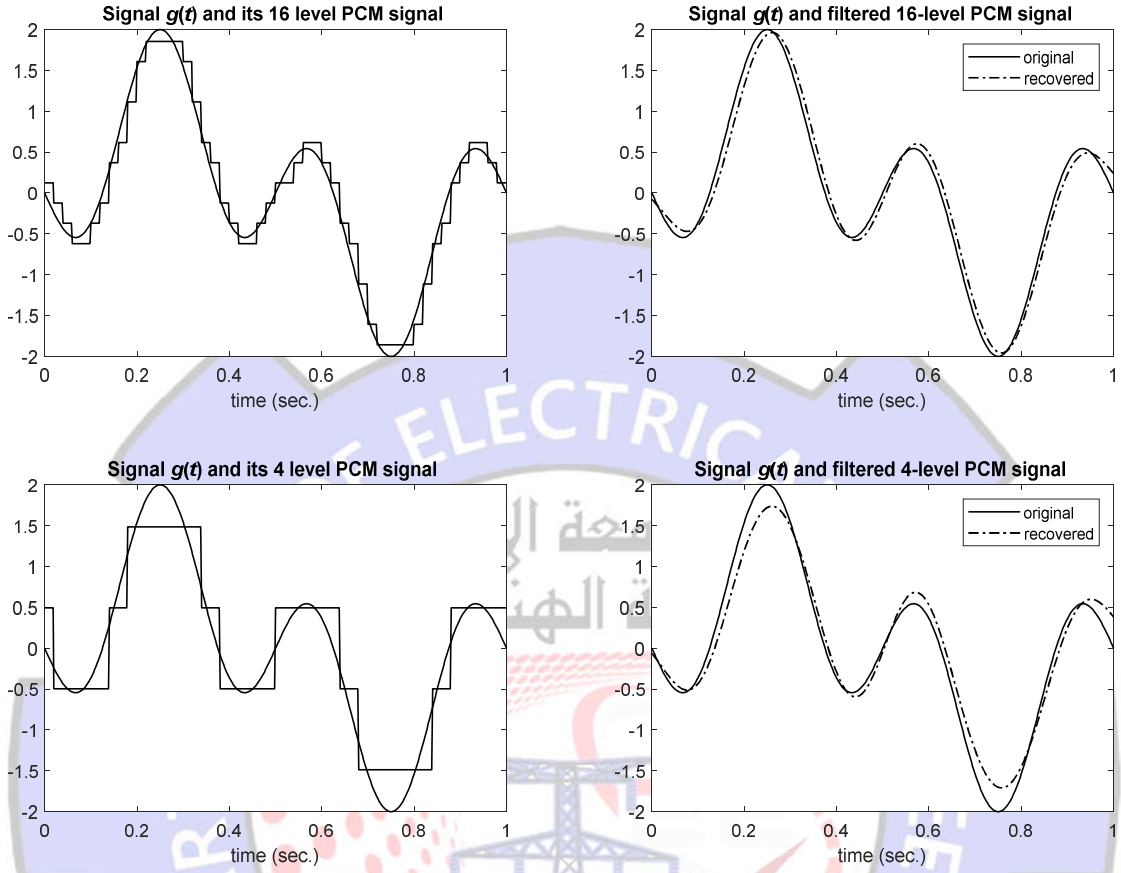
(3) Tune these values to obtain a better output.

(4) Study and examine the reconstruction for different values for f_m , f_S , and D. (Note: you need to adjust the RC values accordingly).





The following plots illustrate the effect of the number of quantization levels and the quantization noise.



4. HOMEWORK

Instead of the used LPF at the reconstruction circuit above, design and use an active. Compare.