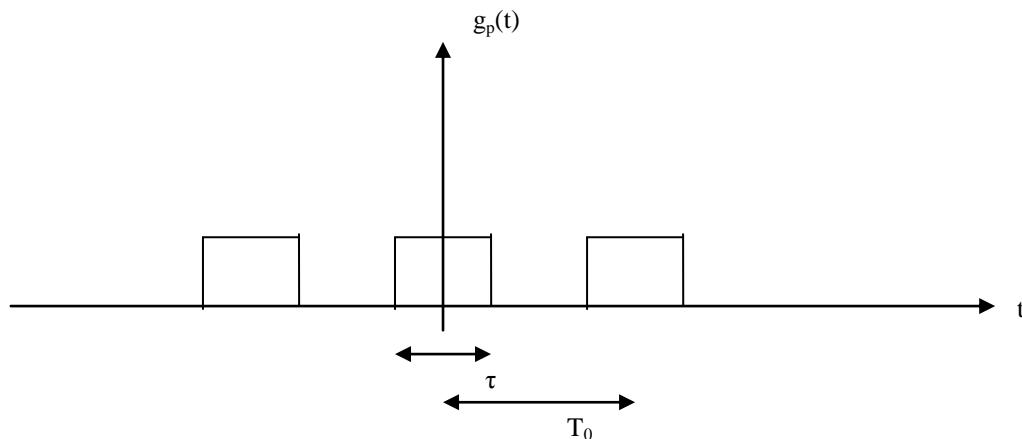




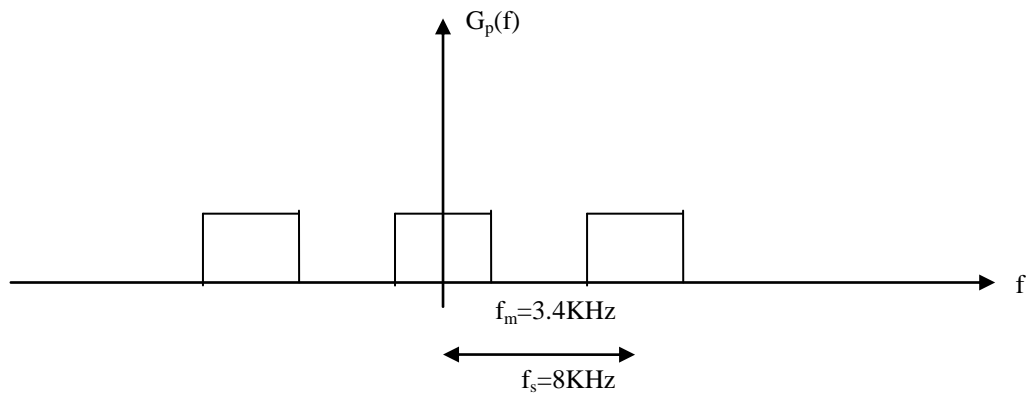
*Sheet (6)*  
*Sampling Theorem*

1. A signal  $g(t) = 10 \text{ Sinc}(10t)$  is to be converted to its sampled version. Plot the signal in time and frequency domains, and then deduce the minimum sampling frequency required for the signal. Plot the signal in time and frequency domains after sampling with  $f_s = 2f_{\text{Nyquist}}$ .
2. The below train of rectangular pulses with a duty cycle  $0.2$  and a fundamental frequency  $1\text{MHz}$  is passed through an ideal low pass filter with cut off frequency  $5\text{MHz}$ .
  - i- sketch the spectrum of the signal before and after the filter.
  - ii- If the filtered signal is to be sampled, what is the minimum frequency required for sampling and why?
  - iii- Sketch the spectrum of the sampled signal with  $f_s = 5\text{MHz}$ .



### Homework assignment

1. The figure given below represents the spectrum of a sampled signal. Find and sketch this signal in time domain.



2. A signal  $g(t) = 10 \cos^3(2\pi 10^3 t)$  is to be sampled. What is the minimum sampling frequency required and why? Sketch the resulting spectrum with three times over sampling.

*Good luck...*