جامعة بيرزيت

BIRZEIT UNIVERSITY

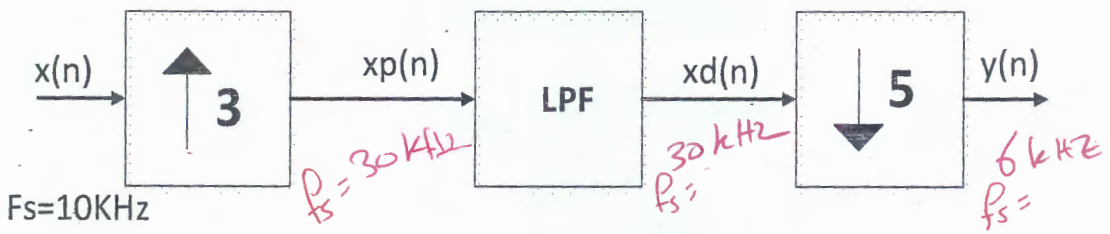
Faculty of Engineering and Technology

Electrical and Computer Engineering

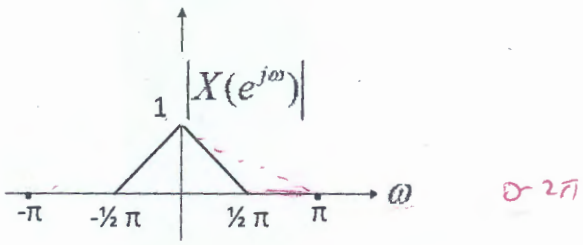
DSP – Quiz (4)

Name: key ID:

Consider the following system:



A speech signal sampled at 10KHz, x(n) has a spectrum magnitude $|X(e^{j\omega})|$ as shown below, is applied to the above system. Assume LPF is an ideal Lowpass filter with magnitude of 1.



a) Find sampling frequency of the signals xp(n), xd(n) and output y(n)? Find the minimum cut-off frequency of the LPF in Hertz and in Radians?

$f_c = 3kHz \Rightarrow \Omega_c = 2\pi f_c = 6000\pi$

$\omega_c = \Omega_c T_s = \frac{6000\pi}{30000} = \frac{\pi}{5}$.

b) Assuming cut-off frequency of the LPF is $\frac{\pi}{5}$, sketch spectrum magnitude of signals xp(n), xd(n) and y(n) for $-\pi \le \omega \le \pi$?