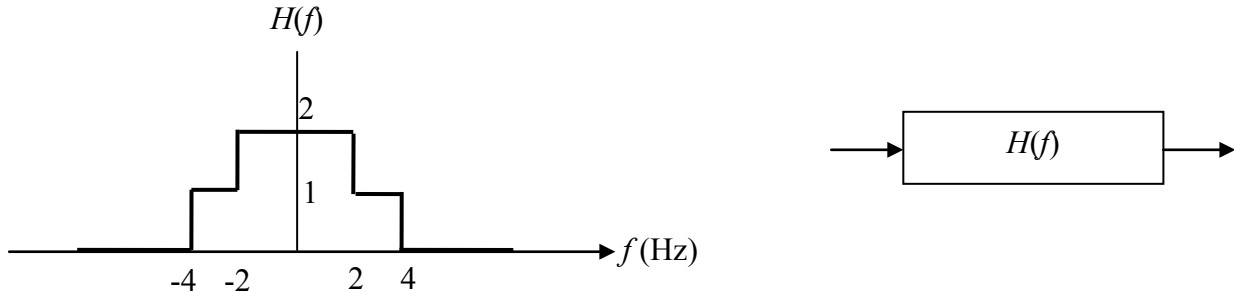


**King Fahd University of Petroleum & Minerals**  
 Electrical Engineering Department  
 EE571: Digital Communications I (111)  
**In Class Group Work**

Names: \_\_\_\_\_

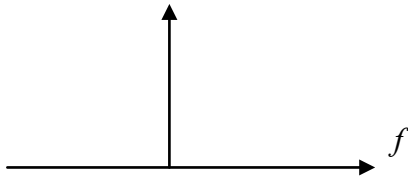
A white Gaussian noise  $w(t)$  with zero mean and  $N_0 = 4 \times 10^{-3}$  Watts/Hz is applied to the input of a linear time invariant system. The transfer function of the filter is shown in the Figure:



- a) Sketch the power spectral density and the autocorrelation for the input white noise.



- b) Sketch the power spectral density of the filtered noise?



- c) Calculate the output noise power.

- d) Find and the autocorrelation of the filtered noise.  $2W \text{ sinc}(2Wt) \Leftrightarrow \Pi\left(\frac{f}{2W}\right)$

- e) Do you think the output noise will be correlated or uncorrelated? State why?

- f) If the input signal is sinusoidal wave corrupted with noise:  $5 \cos(\pi t) + w(t)$ , What would be the signal to noise power ratio at the output.