A white Gaussian noise $w(t)$ with zero mean and $N_0 = 4E-3$ 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. $2W \sin c (2W \tau) \Leftrightarrow \Pi \left( \frac{f}{2W} \right)$

- **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.