IC260- Signals and Systems
Tutorial-5

Date	:	03/06/2013
Time	:	2.00 PM to 3.00 PM
Max. marks	:	20
Good Luck!!		

Q.1 Compute the response $y[n]$ for an input $x[n] = \beta^n u[n]$, given to the LTI system with impulse response $h[n] = \alpha^n u[n]$. (Note: $|\alpha| < 1$ and $|\beta| < 1$). In addition prove that response will be $(n+1)\alpha^n u[n]$ in case of $\alpha = \beta$. (Use the DTFT properties).

Marks : 5

Q.2 Find the overall frequency response of the system shown in Figure 1 and comment – what is the type of the filter?

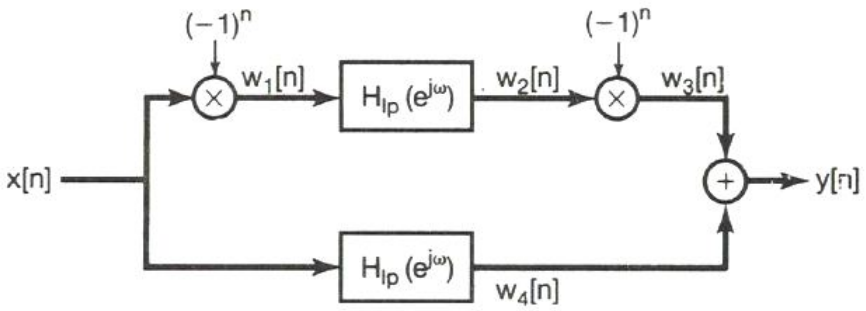

Figure 1: System interconnection for question no.2

Marks : 4

Q.3 Suppose we want to design a discrete time LTI system which has the property that if the input is

$$x[n] = (\frac{1}{2})^n u[n] - (\frac{1}{4})(\frac{1}{2})^{n-1} u[n-1],$$

then the output is

$$y[n] = (\frac{1}{3})^n u[n].$$

(a) Find the impulse response and frequency response of a discrete-time LTI system that has the foregoing property.

Marks : 3

Q.4 Find the unilateral and bilateral Laplace transform of the following two signals

(a) $x(t) = e^{-a(t+1)}u(t+1)$

(b) $x(t) = \exp(-2t)u(t) + \exp(-t)\sin(3t)u(t)$

Marks : 4

Q.5 Show the block diagram realization of LTIC system whose response is

$$y(t) = \frac{1}{4}\exp(-t)u(t) - \frac{1}{4}\exp(-5t)u(t)$$

for the given input $x(t) = (1/4)\exp(-(28/4)t)u(t)$.

Marks : 4