



VIT

Vellore Institute of Technology

Continuous Assessment Test – I

Programme Name & Branch: B. Tech and ECE/BMD

Course Name & Code: Digital Signal Processing (ECE2006)

Class Number:

Slot: G1

Exam Duration: 1h 30 m

Maximum Marks: 50

Section – A (5x 4 = 20 Marks)

- 1.a The response of a system is $y(n) = n x(n)$, where $x(n)$ is a input to the system. Find, whether the system is time variant or not. *$y(n-k) = (n-k)x(n-k)$*
- b Find whether the signal given below is energy or power signal
 $x(n) = \left(\frac{1}{3}\right)^n u(n)$ *$E = 9/8, P = 0$*
- c Find $x(n)$ if $X(e^{j\omega}) = e^{-j\omega} \left(\frac{1}{2} + \frac{1}{2} \cos \omega\right)$. *$x(n) = \left[\frac{1}{4}\delta\left(n-\frac{1}{2}\right) + \frac{1}{4}\delta\left(n+\frac{1}{2}\right)\right]$*
- d Find the ROC of $x(n) = \left(\frac{1}{2}\right)^n u(n) + \left(\frac{1}{3}\right)^n u(-n-1)$. *ROC: DNE*
- e The first five points of the 8-point DFT of a real valued sequence are $\{28, -4+j9.5, -4+j4, -4+j1.6, -4\}$. Determine the remaining three points.

Section – B (3 x 10 = 30 Marks)

- 2 A LTI system is shown in Fig.1. The impulse responses are $h_1(n) = \left(\frac{1}{2}\right)^n [u(n) - u(n-3)]$; $h_2(n) = \delta(n)$; $h_3(n) = \left(\frac{1}{2}\right)^n u(n)$; $h_4(n) = u(n-1)$. Let the impulse response of the overall system is denoted as $h(n)$. Evaluate $h(n)$.

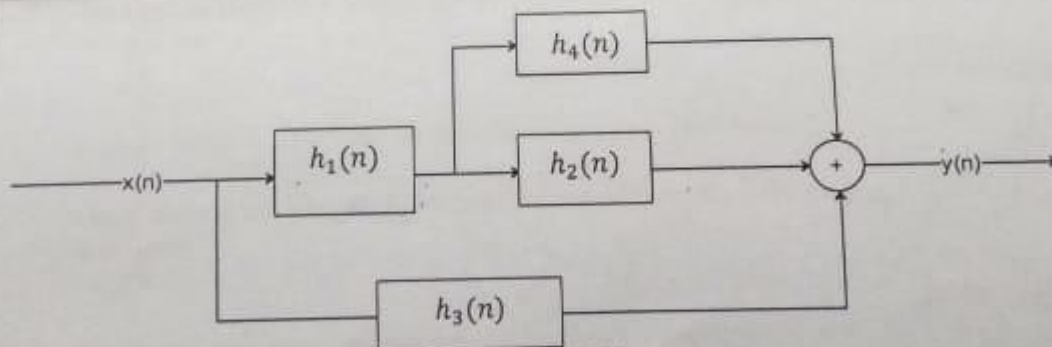


Fig.1 Interconnected LTI system

10

3.
 - a. Find the Fourier transform of $x(n) = \left(\frac{1}{2}\right)^{|n-4|}$.
 - b. Find the inverse z-transform of $X(z) = \frac{1+3z^{-1}}{1+3z^{-1}+4z^{-2}}$ if $1 < |z| < 2$. *partial for*
5+5=10
- 4 Given a continuous signal $f(t) = 5 + 2 \cos(2\pi t - 90^\circ) + 3 \cos(4\pi t)$. Find the DFT by considering sampling frequency $f_s = 4$ Hz. 10