



VIT

Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

SLOT: B1

Vellore – 632014, Tamil Nadu, India

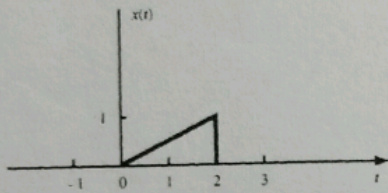
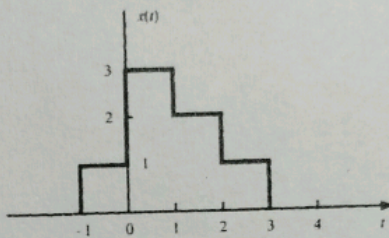
SCHOOL OF ELECTRONICS ENGINEERING

FALL SEMESTER 2024-2025

CAT-1

Programme: B.Tech	Branch: VLSI	Course code: BEVD203L
Course Name: Signal Processing		Date: 26/08/2024
Class Nbr: VL2024250104058	Max Marks: 50	Duration: 90 mins
Faculty name(s): Sudhakar M S		

General instruction(s): 1. Answer ALL the Questions

Q. No	Question	Marks
1.	i. Express the signals in terms of unit step functions. (5)   ii. Determine the even and odd component of the signal (2) $x(t) = \sin\left(\omega_0 t + \frac{\pi}{4}\right)$ iii. Determine whether or not the given signal is periodic. If periodic determine its fundamental period (3) $x[n] = \cos\left(\frac{\pi n}{4}\right) + \sin\left(\frac{\pi n}{8}\right) - 2\cos\left(\frac{\pi n}{2}\right)$	10
2.	i. The step response $s(t)$ of a continuous-time LTI system is given by $s(t) = \cos(\omega_0 t) u(t)$. Find the impulse response $h(t)$ of the system. (3) ii. Determine whether the system represented by the difference equation $y(n) = 3y^2(n-1) - nx(n) + 4x(n-1) - x(n+1), n \geq 0$ is linear, time-invariant and causal. (7)	10
3.	i. Find the linear convolution of the two finite length sequences (5) $x(n) = 0.5n[u(n) - u(n-6)];$ $h(n) = 2 \sin\left(\frac{n\pi}{2}\right)[u(n+3) - u(n-4)]$ ii. Determine the autocorrelation of the signal $x(n) = \{1, 2, 1, 1\}$. (5)	10
4.	Determine the causal signal $x(n]$ having the z-transform $X(z) = \frac{1}{(1+z^{-1})(1-z^{-1})^2}$	10
5.	The step response of an LTI system is $s(n) = \left(\frac{1}{3}\right)^{n-2} u(n+2)$. a. Find the system function and sketch the pole-zero plot (5) b. Determine the impulse response $h(n)$ and check whether the system is causal and stable. (5)	10