SLOT:
E1+TE1

VIT
Vellore Institute of Technology

Vellore – 632014, Tamil Nadu, India

SCHOOL OF ELECTRONICS ENGINEERING

FALL SEMESTER 2024-2025

CAT-1

Programme: B.TECH	**Branch: ECE/BML**	**Course code: BECE301L**
Course Name: DIGITAL SIGNAL PROCESING		**Date: 29/08/2024**
Class Nbr: VL2024250104192	**Max Marks: 50**	**Duration: 90 mins**
Faculty name(s): *Dr S KALAIVANI*		

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

Q. No	Question	Marks
1.	Check whether the given system is linear, stable, time invariant, causal and static and write your justification. $$y[n] = 2x(n+1) + [x(n-1)]^2$$	10
2.	The input to the causal LTI system is, $$x[n] = u[-n-1] + \left(\frac{1}{2}\right)^n u[n]$$ The z-transform of the output of the system is, $$Y(z) = \frac{-\frac{1}{2}z^{-1}}{\left(1-\frac{1}{2}z^{-1}\right)(1+z^{-1})}$$ Determine $H(z)$, the impulse response and the output $y[n]$.	10
3.	(i). Test whether the signal $x[n] = \cos\left[\frac{n}{8} - \pi\right]$ is periodic or not, if periodic find the fundamental period. (ii). Find the energy of the signal $x[n] = \begin{cases} \left(\frac{1}{2}\right)^n, & n \geq 0 \\ 0, & n < 0 \end{cases}$ (iii). Find the 5-point circular convolution of the sequences: $x[n] = [1,3,5,4]$ and $h[n] = [-1,0,1,2]$	2+3+5
4.	A length-8 sequence is given by $x[n] = [1,2,3,4,5,6,7,8]$. Assume that the IDFT of $X[k]$ is $x[n]$. Using the DFT properties, compute the following: i) $IDFT\{W_4^{2k}X[k]\}$ ii) $IDFT\{X[k-4]\}$ iii) $IDFT\{X[k-2] - X[k+2]\}$ iv) $IDFT\{X[k] \otimes \delta[k]\}$	3+2+3+2
5.	Compute the 8-point DFT of the sequence $x[n] = [2\ 4\ 6\ 8\ 8\ 6\ 4\ 2]$ using the DIF- FFT algorithm. Indicate the intermediate node values.	10