

SCHOOL OF ELECTRONICS ENGINEERING
WINTER SEMESTER _ 2023-24
CONTINUOUS ASSESSMENT TEST (CAT)-1
BECE301L- DIGITAL SIGNAL PROCESSING



VIT

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

Course : B.Tech (ECE)
 Class Nbrs : VL2023240501336, 1342, 1344, 1347, 1350, 5420

Slot : C1+TC1
 Date : 13th February 2024
 Faculty: S KALAIVANI, ABHIJIT BHOWMICK, SUDHAKAR M S, LAVANYA N, SARANYA K.C,
 ANANTHAKRISHNA CHINTANPALLI.

Course Mode: CBL
 Duration : 90 Min

Each Question carries 10 marks

Q.No	Question	Marks	CO
1.	Determine the following; a. The discrete system $y[n] = x[n] + nx[n+1]$ is linear or not b. The discrete system $y[n] = \sum_{k=0}^{-3} x[k]$ is causal or not c. The system $y[n] = x[n^2]$ is time invariant or time-varying d. The signal $x[n] = \cos\left[\frac{n}{8} - \pi\right]$ is periodic or not. If periodic find the fundamental period. e. The signal $x[n] = A\delta[n]$ is energy or power signal. Justify your Answers.	10	CO1
2.	(a). A discrete-time linear time-invariant system has a transfer function given by: $H(z) = \frac{3(1 - z^{-1})}{1 - 2.5z^{-1} + z^{-2}}$ Draw the pole-zero diagram of $H(z)$. Specify the ROC and compute $h[n]$ of $H(z)$ for the causal system. (b). Find DTFT of the following signal; $x[n] = \left(\frac{1}{3}\right)^{ n-1 }$	6+4	CO1
3.	For the given sequences, $x_1(n) = \cos\frac{2\pi}{N}n$, $x_2(n) = \sin\frac{2\pi}{N}n$ $0 \leq n \leq N-1$ Determine circular convolution of $x_1(n)$ and $x_2(n)$ using 4-point DFT and IDFT method.	10	CO2
4.	Using the properties of DFT find the following If, $IDFT\{X(k)\} = x(n) = \{1, 2, 1, 0\}$, i. $IDFT\{X(k-1)\}$ ii. $IDFT\{X(k) * X(k)\}$ iii. $IDFT\{X(k) \times X(k)\}$ iv. Signal Energy	10	CO2
5.	An 8-point sequence is given by $x(n) = [2, 2, 2, 2, 1, 1, 1, 1]$. Compute 8-point DFT of $x(n)$ by radix-2 DIT-FFT algorithm. Indicate the intermediate node values.	10	CO2