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

REG.NO.:

NAME OF THE SCHOOL
CONTINUOUS ASSESSMENT TEST - II
FALL SEMESTER 2024-2025

SLOT: B1

Programme Name & Branch	:	B.Tech & VLSI
Course Code and Course Name	:	BEVD203L & Signal Processing
Faculty Name(s)	:	Sudhakar.M.S
Class Number(s)	:	VL202450104058
Date of Examination	:	14.10.2024
Exam Duration	: 90 minutes	Maximum Marks: 50

General instruction(s):

- Answer All Questions
- M - Max mark; CO – Course Outcome; BL – Blooms Taxonomy Level (1 – Remember, 2 – Understand, 3 – Apply, 4 – Analyse, 5 – Evaluate, 6 – Create)
- Course Outcomes
  After completion of the course the student will be able to:
  1. Understand the fundamentals of signal classifications and the concept of sampling theorem.
  2. Understand the different systems and concepts of convolution and correlation
  3. Apply the Fourier concepts to DT signals and Z-transform to analyze the DT systems
  4. Comprehend the various analog filter design techniques and be able to design digital filters
  5. Realize the digital filters using various system interconnections
  6. Understand the types and architecture of digital signal processors

Q. No	Question	M	CO	BL
1.	Compute the 8-point IDFT of the sequence $X(k) = \{4, 1-j2.414, 0, 1-j0.414, 0, 1+j0.414, 0, 1+j2.414\}$ using the radix-2 Decimation In Frequency- FFT algorithm.	10	3	2
2.	Obtain an Analog Chebyshev filter transfer function that satisfies the constraints $\frac{1}{\sqrt{2}} \le \lvert H(j\Omega)\rvert \le 1; \quad 0 \le \Omega \le 2$ $\lvert H(j\Omega)\rvert \le 0.1; \quad \Omega \ge 4$	10	4	2
3.	Design a digital Butterworth filter satisfying the constraints $0.707 \le \lvert H(e^{j\omega})\rvert \le 1 \text{ for } 0 \le \omega \le \frac{\pi}{2}$ $\lvert H(e^{j\omega})\rvert \le 0.2 \text{ for } \frac{3\pi}{4} \le \omega \le \pi$ with T = 1sec. using Bilinear Transformation.	10	5	2
4.	Determine the digital transfer function for the following causal analog transfer function $H_a(s) = \frac{16(s+2)}{(s+3)(s^2+2s+5)}$ Using the impulse invariance method assuming T=0.2 sec.	10	5	2

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5.	Design a FIR filter with $H_d(e^{j\omega}) = e^{-j3\omega}$ for $\frac{-\pi}{4} \leq \omega \leq \frac{\pi}{4}$ $= 0$ for $\frac{\pi}{4} \leq \lvert\omega\rvert \leq \pi.$ Using a Hamming window with N=7	10	5	3

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