Reg.No.:								

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN

[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]

Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 8009

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – MAY / JUNE 2024

Seventh Semester

Electrical and Electronics Engineering

U19EE726 – DIGITAL SIGNAL PROCESSING

(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels	K1 – Remembering	K3 – Applying	K5 - Evaluating
(KL)	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	List few applications of Digital Signal processing.	2	K1	CO1
2.	Define even and odd signal.	2	K1	CO1
3.	Define ROC in Z-transform.	2	K1	CO2
4.	Find Z-transform of $x(n) = -0.5\, u(-n-1)$.	2	K1	CO2
5.	Calculate DFT of $x(n)=\{1,1,-2,-2\}$.	2	K1	CO3
6.	List the properties of DFT.	2	K1	CO3
7.	Distinguish FIR and IIR filters.	2	K1	CO4
8.	Write the steps involved in FIR filter design.	2	K1	CO4
9.	Give the special feature of DSP processor.	2	K1	CO5
10.	Write short notes about arithmetic logic unit and accumulator.	2	K1	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	For each of the following system find whether the system is time invariant or not. i. $y(n)=nx(n)$ ii. $y(n=x(2n)$ iii. $y(n)= e^{x}(n)$ iv. $y(n)=x(n)+nx(n-1)$ v. $y(n)=\cos x(n)$	13	K2	CO1
		(OR)			
	b)	i. Explain analog to digital conversion process and reconstruction of analog signal from digital signal. ii. Explain in detail about sampling, quantization and aliasing effect.	13	K2	CO1
12.	a)	Find the inverse Z-transform of i. $X(z) = z+0.2/(z+0.5)(z-1)$ ii. $X(z) = 1+3z^{-1} / 1 + 3z^{-1}+ 2z^{-}$	13	K2	CO2
		(OR)			
	b)	i. Determine the system function and pole zero pattern for the system described by difference equation $y (n) -0.6 y (n-1) +0.5 y (n-2) = x (n) – 0.7 x (n-2)$	8	K4	CO2
		ii. Find the inverse z-transform of $X(z)=z/(z-3)(z-4)$	5	K2	CO2
13.	a)	From the first principles obtain the signal flow graph for computing 8-point DFT using radix-2 DIT FFT algorithm. Using the above compute the DFT of sequence $x(n)=\{0.5,0.5,0.5,0.5,0,0,0,0\}$.	13	K4	CO3
		(OR)			
	b)	Determine 8-point DFT of the following sequence using DIF FFT algorithm $x(n)=\{1,1,1,1,1,1,1,1\}$	13	K4	CO3
14.	a)	Design a length 5 FIR band reject filter with cut-off frequency of 2KHz, an upper cut-off frequency of 2.4 KHz and a sampling rate of 8000KHz, using hamming window.	13	K4	CO4
		(OR)			

	b)	Design a filter with desired frequency response $$H_d(e^{-j\omega}) = \begin{cases} 1 & for \frac{-\pi}{4} \le \lvert\omega\rvert \le \pi \\ 0 & for\ \lvert\omega\rvert \le \frac{\pi}{4} \end{cases}$$ Use Hanning window for N = 9. And Plot magnitude response	13	K4	CO4
15.	a)	Explain the addressing modes and functional modes of a DSP processor.	13	K2	CO5
		(OR)			
	b)	Describe the architecture of TMS320C5X with neat diagram.	13	K2	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Design a Chebychev filter satisfying the constraints using Bilinear transformation. Assume sampling period of T= 1 Sec. Realize the designed filter with cascade structure $$0.707 \le \lvert H(e^{j\omega})\rvert \le 1.0; \quad 0 \le \omega \le 0.2\pi$$ $$0 \le \lvert H(e^{j\omega})\rvert \le 0.1; \quad 0.5\pi \le \omega \le \pi$$	15	K4	CO4
		(OR)			
	b)	An 8-point sequence is given by x(n)={2,2,2,2,1,1,1,1}. Determine 8-point DFT by radix-2 DIT-FFT method.	15	K4	CO3