Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2026

Fourth Semester

Electronics and Communication Engineering

EC3492 – DIGITAL SIGNAL PROCESSING

Regulations - 2021

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	*Questions*	*BLT*	*CO*	*Marks*
1.	Find the DFT of Y(k) ={1,0,1,0}	L2	1	2
2.	Obtain circular convolution of the following sequence x(n) ={1,2,3} and h(n) ={1,-2,2}	L2	1	2
3.	How many number of additions and multiplications are required to realize a system H(z) having M zeros and N poles in direct form I realization?	L1	2	2
4.	State the need of prewarping.	L2	2	2
5.	List the features of Hamming window.	L1	3	2
6.	What is the disadvantage of Fourier series method?	L1	3	2
7.	Define deadband of the filter	L2	4	2
8.	What is meant by quantization step size?	L2	4	2
9.	What is meant by upsampling?	L2	5	2
10.	Write any two applications of adaptive filter.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Find X(k) using DIT FFT algorithm for x(n) = { 0,1,2,3,4,5,6,7}	L3	1	16
		Or			
	b	Perform the linear convolution of the following sequence by 1. Overlap Add method 2. Overlap save method X(n) ={ 1,2,3,-1,-2,-3,4,5,6} h(n) ={2,1,-1}	L3	1	16
12.	a	Design the Chebyshev filter using bilinear transformation for the following specification. Find the order of the filter. $0.8 \leq \left\|H(e^{j\omega})\right\| \leq 1 \quad for\ 0 \leq \omega \leq 0.2\pi$ $\left\|H(e^{j\omega})\right\| \leq 0.2 \quad for\ 0.6\pi \leq \omega \leq \pi$	L3	2	16
		Or			
	b	Obtain the direct form I, direct form II, cascade and parallel form realization for the system y(n)= -0.1y(n-1) +0.2 y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2)	L3	2	16
13.	a	Design an ideal FIR Low pass filter using rectangular window for N=7 having frequency response as given below: $H_d\,(e^{j\omega}) = \begin{cases} 1 & \frac{\pi}{4} \leq \lvert\omega\rvert \leq \frac{3\pi}{4} \\ 0 & otherwise \end{cases}$	L3	3	16
		Or			
	b	Use frequency sampling method to design a FIR low pass filter with $\omega_c = \pi/4$ for N=15. Plot the magnitude and phase response.	L3	3	16

14.	a	i	Two first order filters are connected in cascade whose system function of the individual sections are $H_1(z) = \frac{1}{1-0.5\,z^{-1}}$ $\quad$ $H_2(z) = \frac{1}{1-0.4\,z^{-1}}$ Determine the overall output noise power if b=3 (excluding sign bit).	L3	4	8
		ii	An LTI system is characterized by the difference equation y(n)= 0.87 y(n-1) + x(n) Determine the limit cycle behavior and deadband of the system when x(n)=0 and y(-1)=0.61. Assume the product is quantized to 4 bits, excluding sign bit by rounding.	L3	4	8
			Or			
	b	i	Describe in detail about the effect of quantization error due to truncation for fixed point 1's complement and 2's complement number.	L3	4	8
		ii	The output of an A/D converter is applied to a digital filter with system function $H(z) = \frac{0.29z}{z-0.64}$. Find the output noise power for the digital filter, when the input signal is quantized to 11 bits.	L3	4	8
15.	a		Elucidate the cascading of sample rate converters.	L2	5	16
			Or			
	b		Discuss in detail the principle of fixed and floating-point principles in Digital signal processors.	L2	5	16

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