Test: CLAT-1
Course Code & Title: 18ECC204J- DIGITAL SIGNAL PROCESSING
Year & Sem: III & V

Date:18.08.2023
Duration: 45 mins
Max. Marks: 25

Course Articulation Matrix:

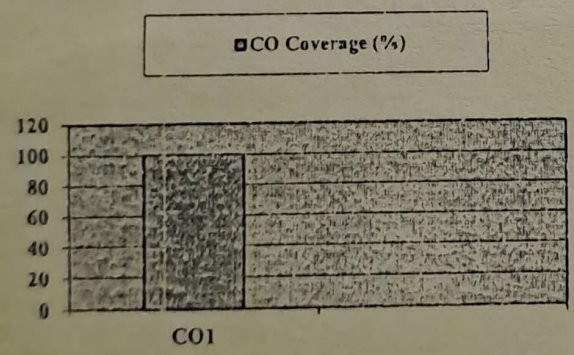
	18ECC204J - DIGITAL SIGNAL PROCESSING	Program Outcomes (POs)												PSO		
		Graduate Attributes														
Os	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
O-1	Determine the knowledge of sampling and quantization and understand the errors that arise due to quantization.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O-2	Understand the concept of DFT and its efficient computation by using FFT algorithm.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
O-3	Design FIR filters using several methods	-	2	3	-	-	-	-	-	-	-	-	-	-	-	3
O-4	Design IIR filters using several methods	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3
O-5	Discuss the basics of multirate DSP and its applications.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
O-6	Apply the concepts of digital filter designs and multi rate signal processing for real time signals.	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-

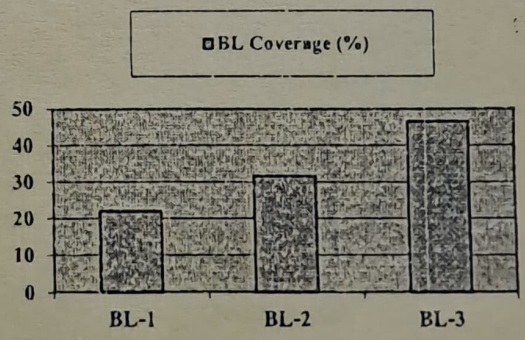
Part - A
(5 x 03 = 15 Marks)
Instructions: Answer Any five Questions

. No	Question	Marks	BL	CO	PO
1	Draw the mathematical model of quantization noise.	3	3	1	1
2	What is the equivalent decimal value for 0.3452 ,when it is rounded to 3 bit?	3	3	1	1
3	i.A signal x(t) =sin (5 πt) is sampled and what is the minimum sampling frequency is needed to reconstruct the signal without aliasing ii. What is the discrete-time signal obtained after sampling the analog signal x(t)=cos(1000*pi*t)+sin(4000*pi*t) at a sampling rate of 4000 samples/sec?	3	1	1	1
4	If the signal varies from -4 to +4 and total number of bits including sign bit to represent the number is' 2',find the quantaziation step size	3	1	1	1

5	Consider the signal $x(n) = 2\cos 150\pi n$. Find the minimum sampling rate required to avoid aliasing.	3	1	1	1
6	The input signal x(n) has a range of -5 V to +5 V, represented by 8-bits. Find the quantization step size, variance of the error signal	3	2	1	1
7	Determine the quantization step size for L=11, $X_{max}=1$ and $X_{min} = 0$ and enumerate the effect of quantization error.	3	3	1	1
	Part – B **(01 x 10 = 10 Marks)**				
8	State Sampling theorem and explain how shifted samples are produced by taking Fourier transform	10	2	1	1
	OR				
9	Consider the signal $x(t) = 3\cos 100\pi t$. a) Find the minimum sampling rate required. b) Suppose the signal is sampled at the rate F_s=200Hz. What is the discrete time signal obtained after sampling? c) Suppose the signal is sampled at the rate F_s=75Hz. What is the discrete time signal obtained after sampling? d)What is the frequency $0<F<F_s/2$ of a sinusoid that gives samples identical to those obtained in part (c).	10	3	1	1

Course Outcome (CO) and Bloom's level (BL) Coverage in Questions





Test: CLAT-2
Course Code & Title: 18ECC204J- DIGITAL SIGNAL PROCESSING
Year & Sem: III & V

Date: 12.10.2023
Duration: 90 mins
Max. Marks: 50

Course Articulation Matrix:

	18ECC204J - DIGITAL SIGNAL PROCESSING	Program Outcomes (POs)														
		Graduate Attributes												PSO		
COs	Course Outcomes (COs)	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3
CO-1	Determine the knowledge of sampling and quantization and understand the errors that arise due to quantization.	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-2	Understand the concept of DFT and its efficient computation by using FFT algorithm	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-3	Design FIR filters using several methods	-	2	3	-	-	-	-	-	-	-	-	-	-	-	3
CO-4	Design IIR filters using several methods	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3
CO-5	Discuss the basics of multirate DSP and its applications.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO-6	Apply the concepts of digital filter designs and multi rate signal processing for real time signals.	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-

Part - A
(5 x 10 = 50 Marks)
Instructions: Answer Any five Questions

Q. No	Question	Marks	BL	CO	PO
1a.	If X(K) is the DFT of x(n)={4,2,3,1) then X(2) is _____ a.2 b.4 c.3 d.5	1	2	2	2
1b.	Find the DFT of $x(n)= 2^n$ by using radix-2 DIF FFT Algorithm	9	4	2	2
2a.	In an N-point sequence, if N = 8, the total number of complex multiplications and additions using DFT are a.64 and 80 b.81 and 64 c.64 and 32 d.64 and 56	1	2	2	2
2b.	Find the DFT of x(n)= {1,2,3,4,4,3,2,1} by using radix-2 DIT FFT Algorithm	9	4	2	2

3a.	The DFT supports only _____ convolution. a.Circular b.Linear c.Both Linear and Circular d.Continuous	1	1	2	2
3b.	Compute the DFT of a sequence $(-1)^n$ for N=8	9	3	2	2
4a.	DFT is applied to_____ a.Infinite sequences b.Finite discrete sequences c.Continuous infinite signals d.Continuous finite sequences	1	1	2	2
4b.	Find the circular convolution of two sequences x1(n)={1,-1,-2,3,-1} and x2(n)={1,2,3}	9	3	2	3
5a.	Which window function is also regarded as 'Raised-cosine window' when α=0.5? a.Hamming b.Barlett c.Hanning d. Blackman	1	1	3	2
5b.	Design an digital FIR filter which is having the frequency respone $H_d(e^{(jw)}) = e^{-j5\omega}$ for $-\pi/2 \le \lvert\omega\rvert \le \pi/2$ 0 otherwise.Find the values of h(n) for N=11 Using Hamming window .Also find H(z)	9	4	3	3
6a.	In FIR filters the _____ response should have large number of samples to realize sharp cutoff filters a.impulse b.step c.steady state d.transient	1	1	3	3
6b.	Design an digital FIR filter using Fourier series method which is having the frequency response H(ejw) = 1 for $\pi/6 \le \lvert\omega\rvert \le \pi$ 0 otherwise. Find the h(n) for N=7. Also find H(z)	9	4	3	3
7a.	An FIR filter of order N is characterized by _____ coefficients and, in general, require _____ multipliers and _____ two-input adders a.N-1,N+1,N+1 b.N+1,N,N c.N+1,N-1,N d.N+1,N+1,N	1	2	3	3
7b.	Design an digital FIR filter which is having the frequency response $H_d(e^{jw}) = 1$ for $-\pi/2 \le \omega \le \pi/2$ 0 otherwise. Find the values of h(n) for N=11. Also find H(z)	9	4	3	3