Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make-up Examinations – December 2025

Date: 27 – 12- 2025 **Time:** 01:00pm – 04:00pm

School : SOE	**Program** : B.Tech.,(VLSI)	
Course Code : ECE3109	**Course Name** : SIGNAL PROCESSING	
Semester : MK	**Max Marks** : 100	**Weightage** : 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**17**	**25**	**27**	**31**	**NA**

Instructions:

(i) Read all questions carefully and answer accordingly.

(ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1	FFT is a divide and conquer algorithm, Where DIT FFT algorithm divides the sequence into_____ i)Positive and negative values ii) Even and odd samples Upper iii)higher and lower spectrum iv) Small and large samples	**2 Marks**	**L1**	**CO2**
2	Decimation-in Time FFT algorithm is used to compute_____	**2 Marks**	**L1**	**CO2**
3	The Discrete Fourier transform of circular convolution of two sequences in time domain is equivalent to a) Summation of DFTs of two sequences b) Multiplication of DFTs of two sequences c) Summation of IDFTs of two sequences d) Multiplication of IDFTs of two sequences	**2 Marks**	**L1**	**CO2**
4	The discrete time unit impulse function, also known as the unit sample function has a great reputation in the study of signals and systems. The discrete impulse function is defined as_____	**2 Marks**	**L1**	**CO1**
5	How many complex multiplications are need to find N point DFT using FFT algorithm?	**2 Marks**	**L1**	**CO2**

6	If x(n)={ 1,2,3,4}, then Discrete Fourier Transform X(0) is_____	**2 Marks**	**L1**	**CO2**
7	FIR digital filter is_____(Recursive / Non-Recursive)	**2 Marks**	**L1**	**CO4**
8	$H(z)=1+(1/3)z^{-1}+z^{-2}+(1/4)z^{-3}+z^{-4}+(1/3)z^{-5}+1\ z^{-6}$ For the given transfer function, how many minimum multipliers are needed in linear phase implementation?	**2 Marks**	**L1**	**CO4**
9	Identify the filter type, for the given difference equation $y(n)=x(n)+2x(n-1)+x(n-2)+4x(n-3)+x(n-4)+2x(n-5)+x(n-6)$	**2 Marks**	**L1**	**CO4**
10	No. of memory needed to design a Direct Form-II filter for the difference equation, $y(n)+2y(n-1)=x(n)+5x(n-1)-4X(n-2)$ is ____	**2 Marks**	**L1**	**CO3**

Part B

Answer the Questions. **Total Marks 80**

11.	**a.**	For the given desired frequency response, $H_d(e^{j\omega}) = \begin{cases} e^{-3j\omega} & \frac{\pi}{4} < \lvert\omega\rvert < \pi \\ 0 & otherwise \end{cases}$ with length N= 7, Using rectangular window, Design FIR filter with frequency response:	**25 Marks**	**L3**	**CO4**
	b.	For the given difference equation, obtain the structure using minimum multiplier $y(n)=x(n)+3x(n-1)+2x(n-2)+2x(n-3)+3x(n-4)+x(n-5)$			

Or

12.	**a.**	For the given desired frequency response $H_d(e^{j\omega}) = \begin{cases} e^{-5j\omega} & \lvert\omega\rvert \le \frac{\pi}{4} \\ 0 & otherwise \end{cases}$ with length N= 11, Using rectangular window, Design FIR filter and find frequency response:	**25 Marks**	**L3**	**CO4**
	b.	For the given difference equation, obtain the Direct form realization $y(n)=x(n)+3x(n-1)+2x(n-2)+2x(n-3)+3x(n-4)+x(n-5)$			

13.	**a.**	For the given difference equation, obtain the Direct form-I realization	**25 Marks**	**L3**	**CO3**

	b.	*y(n)=0.5y(n-1)+0.06y(n-2)+0.125y(n-3)+0.3x(n)+0.5x(n-1)+2x(n-2)+3x(n-3)* An analog filter has a transfer function $H(s)=\frac{10}{(s^2+7s+10)}$, Design a Digital filter using Impulse Invariant Method when **T=0.2 sec:**			

Or

14.	**a.**	Using Bilinear Transformation Method, Fid H(z) when $H(s)=\frac{2}{(s+1)(s+2)}$	**25 Marks**	**L3**	**CO3**
	b.	Realize the Direct form-II for the given output equation, *y(n)=0.5y(n-1)+0.06y(n-2)+0.125y(n-3)+0.3x(n)+0.5x(n-1)+2x(n-2)+3x(n-3)*			

15.	**a.**	By using DFT/FFT and IDFT/IFFT find the circular convolution for the given two sequences and verify your answer using the matrix method. $x1(n)=\{1,2,2,1\}$ $x2(n)=\{1,2,3,4\}$	**15 Marks**	**L2**	**CO2**

Or

16.	**a.**	Using radix2-DIFFFT algorithm, compute Fourier Transform for the given sequence $x(n)=\{1,2,3,4,5,6,7,8,\}$	**15 Marks**	**L2**	**CO2**

17.	**a.**	Find y(n) for the given x(n) and h(n) by using Overlap Add Method, Where $x(n)=\{1,2,3,4,5,6,7,8,9,1,2,3,4\}$ $h(n)=\{1,1,1\}$	**15 Marks**	**L2**	**CO1**

Or

18.	**a.**	Find y(n) for the given x(n) and h(n) by using Overlap Save Method, Where $x(n)=\{1,2,3,4,5,6,7,8,9,1,2,3,4\}$ $h(n)=\{1,1,1\}$	**15 Marks**	**L2**	**CO1**

******* BEST WISHES *******