C **Reg. No. :** | | | | | | | | | | |

Question Paper Code: 96421

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2025

Sixth Semester

Electrical and Electronics Engineering

19UEC621– DIGITAL SIGNAL PROCESSING FOR ELECTRICAL ENGINEERS

(Regulations 2019)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 1 = 5 Marks)

1. Which of the following system is Causal? CO2- App

   (a) y(n)=x(n) (b) y(n)=x(2n) (c) y(n)=x(n-1) (d)y(n)=x(n+1)

2. If $x[n] = (1/3)^{|n|} - (1/2)^{n}u[n]$, then the region of convergence (ROC) of its Z – transform in the Z – plane will be CO2- App

   (a) $1/3 < |z| < 3$ (b)$1/3 < |z| < 1/2$ (c)$1/2 < |z| < 3$ (d) $1/3 < |z|$

3. The concept zero padding is used in _____ convolution CO1- U

   (a) Linear (b) Circular (c) Non-Linear (d) None of the above

4. The normalized transfer function of 3rd order low pass Butter worth filter is CO1- U

   (a) $1/s^3+1.414s^2+s+1$ (b) $1/(s+1)(s^2+s+1)$ (c) $1/s^2(s+1)$ (d) $1/s^3+s^2+s+1$

5. The MMRs of TMS320C5x processor can be directly addressed by CO1- U

   (a) 7-bit address (b) 8-bit address (c) 9-bit address (d) 11-bit address

PART – B (5 x 3= 15Marks)

6. Determine whether the given signal is periodic or non -periodic. CO2- App

   $x(n)= \cos(2\pi n)$.

7. Convolute x (n) = {4,3,2,1 } and h(n) = {2,1,2,1} CO2- App

8. Compare DFT and DTFT. CO1- U

9. State Gibbs Phenomenon. CO1- U

10. Differentiate direct and indirect addressing mode. CO1- U

PART – C (5 x 16= 80 Marks)

11.	(a)	A discrete system can be (i) Static or Dynamic (ii) linear or Nonlinear (iii) Time Invariant or varying (iv) Causal or Non causal (v) Stable or Unstable. Examine the following systems with respect to the properties (i) $y(n) = \cos [x(n)]$ (ii) $y(n) = x(-n+2)$	CO2-App	(8) (8)
		Or		
	(b)	Find whether the signal is an energy or power signal (i) $y[n] = 2n\ u[n]$ (ii) $y(n) = \cos(\pi/4\ n)$	CO2-App	(8) (8)
12.	(a)	Find Inverse Z transform (i) $X(z) = z^2 / (Z^2+7z+12)$ (ii) $z^{-1}(5z^2+z / z^2+8z+15)$	CO2-App	(8) (8)
		Or		
	(b)	For the given sequences $x(n) = \{1,2,3,4\}$ & $h(n) = \{1,3,5\}$, find the output sequence y(n) by using linear convolution and circular convolution	CO2-App	(16)
13.	(a)	Determine 4-point DFT of The Sequence $X(n)=\{1,1,1,1\}$	CO2-App	(16)
		Or		
	(b)	Find the sequence x(n) corresponding to 8 point FFT using DIF-FFT for $x(n)=\{1,1,1,1,1,1,1,1\}$. Analyze FFT of the above sequence using DIT method.	CO4-App	(16)
14.	(a)	Design a high pass filter using a hamming window with a cut off frequency of 1.2 π r/s with 9 samples.	CO3-App	(16)
		Or		
	(b)	Design a Chebyshev filter with a maximum passband attenuation of 2.5db at $\Omega p=20$ rad/sec and stop band attenuation of 30db at $\Omega s=50$ rad/sec.	CO3-App	(16)
15.	(a)	With a neat functional block diagram, explain the architecture of TMS320C5X processor and explain.	CO1- U	(16)
		Or		
	(b)	List the addressing modes of TMS320C5X processor with relevant examples.	CO1- U	(16)