R22 Regulation *Subject code: 4E5BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

(Autonomous, Accredited by NAAC with 'A+' Grade)

B.Tech V Semester Regular/Supplementary Examinations, November 2025

DIGITAL SIGNAL PROCESSING

(EEE)

Maximum Marks: 60 Date:10.11.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 10 marks. Answer all questions in Part A.
3. Part B consists of 5 Units. Answer any one full question from each unit.
4. Each question carries 10 marks and may have a, b, c, d as sub questions.

Part-A

All the following questions carry equal marks (10X1M=10 Marks)		Marks	CO	Bloom Tx
1.a)	Give the condition for stability of a system.	1M	1	L2
b)	Find the Z-transform of $(n) = 2^n u(n-2)$.	1M	1	L2
c)	How to find linear convolution of two sequences using DFT?	1M	2	L2
d)	Draw the diagram showing Radix-2 Decimation –in –Time FFT	1M	2	L1
e)	Give the formula for analog to digital transformation using Bilinear transformation.	1M	3	L2
f)	List any one disadvantage of impulse invariant transformation.	1M	3	L2
g)	Write the Hanning window function used for FIR filter design.	1M	4	L2
h)	Define Gibb's phenomenon.	1M	4	L2
i)	Draw the block diagram showing decimation and interpolation.	1M	5	L1
j)	Define round off noise.	1M	5	L2

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	Bloom Tx
2	Define discrete time system? Explain the following systems with an example: (i) Linear and non-linear systems (ii) Stable and unstable systems	10M	1	L2
	OR			
3	Determine whether each of the following systems defined below is (i) casual (ii) linear (iii) dynamic (iv) time invariant (a) y(n) = log10[{x(n)}] (b) y(n) = x(-n-2)	10M	1	L2
4	a) Mention the properties of discrete Fourier transform and derive any two of them. b) Compute the DFT for the sequence {1, 2, 0, 0, 0, 2, 1, 1}. Using radix -2 DIF FFT and radix-2 DIT- FFT algorithm.	5M 5M	2	L2
	OR			
5	Compare overlap add method and save method.	10M	2	L2

6	a) Compare bilinear transformation and impulse invariant mapping. b) Find $H(z)$ using the impulse invariant transformation for the analog system function, Assume $T = 1\ s$. $$H(s) = \frac{1}{(s+0.5)(s^2+0.5\,s+2)}$$	5M 5M	3	L2
	OR			
7	a) Compare and Contrast Butterworth and Chebyshev approximations b) List the advantages & disadvantages of FIR & IIR filters.	5M 5M	3	L2
8	a) Explain FIR filter design using windowing method. b) Design a High Pass FIR filter whose cut-off frequency is 1.2 radians/sec and N = 9 using Hamming Window.	5M 5M	4	L2
	OR			
9	a) What is a Kaiser window? In what way is it superior to other window functions? b) Discuss and derive the Fourier series method.	5M 5M	4	L2
10	Explain the following terms: i) Up – sampling ii) Down- sampling	10M	5	L2
	OR			
11	a) Explain the different types of limit cycles. b) Explain about sampling rate conversion	5M 5M	5	L2