R20 Regulation *Subject code:3P6DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, May 2025

DIGITAL SIGNAL PROCESSING

(ECE)

Maximum Marks: 70 Date: 20.06.2025 Duration: 3 hours

Note: **1.This question paper contains two parts A and B.**
2. Part A is compulsory which carries 20 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 (10X2M=20 Marks)		Marks	CO	BTL
1	Determine the fundamental period of a signal x(n)=cos($\frac{\pi}{3}n$)	2M	1	L1
2	How many number of additions, multiplications and memory locations are required to realize a system having M zeros and N poles.	2M	1	L1
3	What are the two methods of sectioned convolution	2M	2	L1
4	Calculate the number of multiplications required to compute 16 point DFT to FFT.	2M	2	L1
5	What is the effect of varying order of Butterworth filter (N) on magnitude and phase response.	2M	3	L1
6	What are the parameters that can be obtained from the Chebyshev filter specification.	2M	3	L1
7	State the condition for a digital filter to be causal and stable.	2M	4	L1
8	Define filter.	2M	4	L1
9	Define interpolation process.	2M	5	L1
10	Write basic architectural features of Digital signal processors.	2M	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		Marks	CO	BTL
11	a) Discuss any four discrete time sequences. b) Explain in detail about the blocks involved in Digital Signal Processing System	4M 6M	1	L2
	OR			
12	Obtain the Direct form-I, Direct form-II realization for the system y(n)=0.1y(n-1)+0.2y(n-2)+3x(n)+3.6x(n-1)+0.6x(n-2)	10M	1	L2
13	Perform Linear convolution of the two sequences x(n) = {1,2,-1,2,3,-2,-3,-1,1,1,2,1-1} and h(n) = {1,2}using over-lap save method.	10M	2	L2
	OR			
14	Develop a 8 point DIT FFT algorithm. Draw the signal flow graph for the following sequence x(n) = {1, 1, 1, 1, 0, 0,0, 0} using the signal flow graph. Show all the intermediate results on the signal flow graph.	10M	2	L2

15	For the given specifications design an analog Butterworth low pass filter $0.9 \leq \lvert H(j\Omega) \rvert \leq 1$ for $0 \leq \Omega \leq 0.2\pi$ $\lvert H(j\Omega) \rvert \leq 0.2$ for $0.4\pi \leq \Omega \leq \pi$	10M	3	L2
	OR			
16	Explain in detail about analog lowpass Chebyshev filters with respect to the pole locations.	10M	3	L2
17	Design an ideal low pass filter whose frequency response $H_d(e^{j\omega}) = 1$ for $-\pi/2 \leq \omega \leq \pi/2$ $= 0$ for $\pi/2 \leq \omega \leq \pi$. Find the values of h(n) for N=11. Find H(z) using Hanning Window	10M	4	L2
	OR			
18	a) Distinguish between FIR and IIR filters b) Explain necessary and sufficient condition for linear phase characteristics in FIR filter.	4M 6M	4	L2
19	Explain computational building blocks of Digital signal processors.	10M	5	L2
	OR			
20	Outline the process of Down sampling and derive its spectrum.	10M	5	L2