R18 Regulation *Subject code:2P5DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, April 2026

DIGITAL SIGNAL PROCESSING

(ECE)

Maximum Marks: 70 Date: 20.04.2026 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	What is meant by zero state response of a system.	2M	1	L1
2	Determine z-transform of the finite duration signal x(n)={2,4,7,0,1}	2M	1	L1
3	What is twiddle factor?	2M	2	L1
4	Draw the basic butterfly diagram of DIT algorithm.	2M	2	L1
5	Give the equation for the order and cut-off frequency of Butterworth filter.	2M	3	L1
6	What are the parameters that can be obtained from the Chebyshev filter specification.	2M	3	L1
7	What are the different types of filters based on impulse response.	2M	4	L1
8	State the desirable characteristics of the window.	2M	4	L1
9	Define Multirate digital signal processing.	2M	5	L1
10	What is truncation.	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 and Parallel form realization for the system. $y(n)=-0.1y(n-1)-0.72y(n-2)+0.7x(n)-0.252x(n-2)$	10M	1	L2
13	a) Compare the computational complexity of FFT and DFT b) Distinguish between overlap-save and overlap-add methods	5M 5M	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	a) For the analog transfer function determine H(z) using impulse invariant method. Assume T=1sec $H(s)= \frac{2}{(s+1)(s+2)}$ b) Compare the differences between Butterworth and Chebyshev filters.	6M 4M	3	L2
	OR			
16	For $H(s)= \frac{2}{(s+1)(s+2)}$ with T=1sec and find H(z) explain along with steps involved in design of a digital filter using Bilinear transformation method.	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	L3
	OR			
18	a) List the advantages and disadvantages of FIR filter over IIR filter. b) Explain the Design of FIR digital filter by using fourier series method.	5M 5M	4	L2
19	a) Show that interpolator is a time variant system. b) What is the significance of Multirate signal processing and its applications.	5M 5M	5	L2
	OR			
20	Outline the process of Down sampling and derive its spectrum.	10M	5	L2