R20 Regulation *Subject code: 3P6DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, April 2026

DIGITAL SIGNAL PROCESSING

(ECE)

Maximum Marks: 70 Date: 18.04.2026 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	Write the significance of DFT on FFT?	2M	2	L1
5	List two properties of Butterworth lowpass filter.	2M	3	L1
6	Write the bilinear transform equation between s-plane and z-plane.	2M	3	L1
7	Define Phase delay.	2M	4	L1
8	What are the desirable characteristics of the window?	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) Explain in detail about the block diagram of DSP and its applications. b) Test for Linearity, Causality & Time variance and Invariance for the given systems described by i) $y(n)=n\,x(n)$ ii) $y(n)=x(-n)$	5M 5M	1	L2
	OR			
12	Solve the z-transform and ROC of the following sequences a) $x[n]=[4(5^n)-3(4^n)]\,u(n)$ b) $x[n]=(1/3)^n\,[u(n)-u(n-8)]$	5M 5M	1	L2
13	a) State and prove the periodicity property of DFT. b) Compute the DFT of a sequence $(-1)^n$ for N=8.	3M 7M	2	L2
	OR			
14	Develop a 8 point DIT FFT algorithm. Build the signal flow graph for the following sequence x(n) = {1, 1, 1, 1, 0, 0,0, 0}	10M	2	L2
15	a) 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 $0.4\,\pi\leq\Omega\leq\pi$	7M	3	L2

	b) Specify various types of filters available based on frequency selection.	3M		
	OR			
16	Explain in detail about design of analog lowpass Chebyshev filters with respect to the pole locations.	10M	3	L2
17	Derive the condition for filter to have linear phase characteristics.	10M	4	L2
	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.	4M 6M	4	L2
19	Explain the data addressing modes of TMS320C54XX Digital signal processors.	10M	5	L2
	OR			
20	Relate the process of Interpolation and Decimation in multirate signal processing also plot and derive their respective spectrums.	10M	5	L2