



Regulation R18

Subject code:2P5DC

# TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

**B.Tech V Semester Supplementary Examinations, February 2024**

## DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Maximum Marks: 70

Date:20.02.2024 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 10 questions. Answer any 5 questions which carries 12M.
  4. Each question carries 12marks and may have a, b, c, d as sub questions.

### Part-A

All the following questions carry equal marks		(10X2M=20 Marks)	CO	Bloom Tx
1	What is meant by zero state response of a system?		CO1	L1
2	Determine z-transform of the finite duration signal $x(n)=\{2,4,7,0,1\}$		CO1	L3
3	What is twiddle factor?		CO2	L1
4	Specify the significance of DFT on FFT?		CO2	L2
5	Give any two properties of Butterworth lowpass filter		CO3	L1
6	Write the bilinear transform equation between s-plane and z-plane.		CO3	L1
7	Define Phase delay		CO4	L1
8	Comment when FIR filter gives linear phase		CO4	L2
9	Define interpolation process.		CO5	L1
10	What is overflow oscillations.		CO5	L1

### Part-B

Answer all the questions		(10MX 5=50Marks)		
11	A causal LTI system is described by the difference equation $y(n)=y(n-1)+y(n-2)+x(n-1)$ . where $x(n)$ is input and $y(n)$ is output. Find: i) The system function $H(z)$ . Plot the poles and zeros of $H(z)$ and indicate the ROC. ii) Find the impulse response of the system. iii) Is the system stable or not? (10M)		CO1	L3
OR				
12	Explain the block diagram of DSP and mention its applications. (10M)		CO1	L2
13	a) Find 4-Point DFT of the given time domain sequence $x(n) = \{1, 2, 3, 4\}$ . (5M) b) Find out $y(n)$ of a filter whose impulse response is $h(n)=\{1,1,1\}$ and the input signal $x(n)=\{3,-1,0,1,3,2,0,1,2,1\}$ using Overlap-add method. (5M)		CO2	L3
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)		CO2	L3

15	a) Distinguish between Butterworth and Chebyshev filters. (5M) b) Design Chebyshev low pass filter with the given specifications $\alpha_p=2.5\text{dB}$ , $\alpha_s=30\text{dB}$ at $\Omega_p=20\text{ rad/sec}$ , $\Omega_s=50\text{ rad/sec}$ . (5M)	CO3	L4
OR			
16	a) Distinguish Analog and Digital Filters. (5M) b) Outline the concepts i) Bilinear transformation ii) Impulse Invariance. (5M)	CO3	L3
17	a) Distinguish between FIR and IIR filters. (5M) b) Explain briefly method of designing FIR filter using Fourier series method. (5M)	CO4	L2
or			
18	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 Hamming Window. (10M)	CO4	L4
19	a) Write short notes on Dead band effects. (5M) b) Why rounding is preferred to truncation in realizing digital filters. (5M)	CO5	L2
OR			
20	Outline the process of Down sampling and derive its spectrum. (10M)	CO5	L2