Regulation R18 *Subject code: 2P5DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, January 2023

DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Maximum Marks: 70 **Duration: 3 Hours**

Part-A

All the following questions carry equal marks (10x2M=20 Marks)

1 What is region of convergence (ROC).
2 Test the time invariance for the given signal y(n)=nx(n)
3 What is meant by zero padding?
4 Draw the basic butterfly diagram of DIT algorithm
5 Give any two properties of Butterworth lowpass filter
6 Write the bilinear transform equation between s-plane and z-plane.
7 Define Phase delay
8 Comment when FIR filter gives linear phase
9 Define interpolation process.
10 What is overflow oscillations.

Part-B

Answer all the question (10MX 5=50Marks)

11 Define: a) Linear and Non-linear systems b) Causal systems and non-causal systems. [5+5]

OR

12 a) Define the LTI system and its need. [4]
b) Explain DSP block diagram. [6]

13 Explain the DFT and Find 4-Point DFT of the given time domain sequence x(n) = {1, 0, 3, 4}. [10]

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. [10]

15 a) Distinguish between Butterworth and Chebyshev filters.
b) Design Chebyshev low pass filter with the given specifications α_p =2.5dB, α_s =30dB at Ω_p=20 rad/sec, Ω_s=50 rad/sec. [4+6]M

OR

16 For the given specifications design an analog Butterworth filter

$0.707 \leq |H(j\Omega)| \leq 1$ for $0 \leq \Omega \leq \pi/2$

$|H(j\Omega)| \leq 0.2$ for $3\pi/4 \leq \Omega \leq \pi$ with T=1sec

Using Bilinear transformation technique. [10]

17 a) Distinguish between FIR and IIR filters

b) Explain briefly method of designing FIR filter using Fourier series method. [4+6]M

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]

19 a) Write about Dead band effects.

b) Why rounding is preferred to truncation in realizing digital filters. [5+5]M

OR

20 Outline the process of Down sampling and derive its spectrum [10M]