Regulation R18 *Subject code:2P5DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, June/July 2023

DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Maximum Marks: 70 Date:28.06.2023 **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)

1 Define the Digital System.
2 Determine z-transform of impulse function.
3 What is twiddle factor?
4 Specify the significance of DFT on FFT?
5 Give the order of Butterworth lowpass filter
6 Write the bilinear transform equation between s-plane and z-plane.
7 What are the different types of filters based on impulse response
8 State the desirable characteristics of the window
9 Define Decimation process.
10 What are the applications of Multirate signal processing.

Part-B

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

11 system is described by y(n)=(n+1)x(n).Test the system for i)Causality ii)Linearity iii)Time invariance and iv)Stability. (10M)

OR

12 An LTI system is described by the equation y(n) = x(n)+0.8x(n-1)+0.7x(n-2)- 0.45y(n-2). Determine the transfer function of the system. Sketch its poles and zeros on the Z-plane. (10M)

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

OR

14 Develop 8 point DIT FFT algorithm. Draw the signal flow graph for the following sequence x(n) = {1, 1, 0, 1, 1, 0,0, 0} using the signal flow graph. Show all the intermediate results on the signal flow graph. (10M)

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. (5+5)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. (10M)

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 a short notes on 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)