R20 Regulation *Subject code:3P6DC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Regular Examinations, June/July 2023

DIGITAL SIGNAL PROCESSING

(Electronics and Communication Engineering)

Maximum Marks: 70 Date:27.06.2023 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 which carries 10M.
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)

1 Differentiate between Analog and digital signal.
2 What is the relationship be tween z-transform and DTFT.
3 Define Convolution.
4 Draw Radix-2 DIT FFT and DIF FFT Butterfly diagrams
5 State about IIR digital filter
6 State the types of realization of IIR filters.
7 Define the FIR filter.
8 What are the steps involved in the FIR filter design?
9 List out the Applications of multi rate DSP.
10 Define Harvard architecture of Programmable DSP Processors.

Part-B

Answer All the following questions. (10MX 5=50Marks)

11 A. Sketch the discrete time signal $x(n) = 4\,\delta(n+4) + \delta(n) + 2\,\delta(n-1) + \delta(n-2)$ [5]
B. List out the operations performed on the signals. [5]

OR

12 A. Find the Z- Transform of following $x(n)=(1/2)^n u(n)$ [5]
B. Find the inverse Z- Transform of $x(z)= z / 3z^2-4z+1$ ROC $|Z| >1$ [5]

13 Find the DFT of a sequence $x(n)=\{1,2,3,4,4,3,2,1\}$. [10]

OR

14 Describe Radix-2 DIT-FFT algorithm. Compare it with DIF-FFT algorithms. [10]

15 Design a second order Butterworth-type IIR lowpass filter with $\Omega c = \pi / 4$. [10]

OR

16 A. How can you design a digital filter from analog filter? [5]
B. Write the steps in designing chebyshev filter? [5]

17 A. How do you compare Butterworth with Chebyshev filters? [5]
B. What is difference between IIR and FIR filter? [5]

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). [10]

19 Consider a signal x(n) = u(n) [5+5]
(i) Obtain a signal with a decimation factor '3'
(ii) Obtain a signal with a interpolation factor '3'.

OR

20 Explain the architectural features of Programmable DSP Processors. [10]