R18 Regulation *Subject code: 2E5BC*

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, June 2024

Digital Signal Processing

(EEE)

Maximum Marks: 70 Date:26.07.2024 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)		CO	Bloom Tx
1	What are the classifications of discrete signals .	1	L1
2	Find the Z-transform of $x(n)=a^n u(n)$ and its ROC.	1	L2
3	State and prove any two properties of DFT.	2	L2
4	Define DIT and DIF algorithms.	2	L1
5	What are the properties of Butterworth low pass filter.	3	L1
6	What are the advantages of impulse invariant technique?	3	L2
7	Define FIR system? What are the methods to design FIR system.	4	L1
8	What is rectangular window.	4	L2
9	What are the advantages of sampling rate conversion.	5	L1
10	What do you mean by decimation and interpolation	5	L2
	Part-B		
Answer All the following questions. (5X10M=50Marks)			
11	a) Determine the impulse response of the system. [5M] $y(n)-y(n-1)=x(n)+x(n-1)$ b) Define the following i) Continuous-time signal ii)Discrete-time signal iii)Digital signal. [5M]	1	L3 L2
	OR		
12	a) What are the applications of Z-transforms? [5M] b) Derive condition for stability using Z transform and also write the properties of frequency response. [5M]	1	L2 L4
13	a) How can you obtain linear convolution from Circular convolution. [5M] b) Compare overlap save method and overlap add methods. [5M]	2	L2 L3
	OR		
14	a) Draw the basic butterfly diagram for DIT and DIF algorithms. [5M] b) Find the IDFT of the given signal X(k)= {10, -2+2j,-2,-2-2j}by using DIF-IFFT algorithm.[5M]	2	L2 L4

15	a) What are the advantages and disadvantages of bilinear transformation method. [5M] b) Compare Butterworth and Chebyshev filter. [5M]	3	L3
	OR		
16	a) Explain impulse invariance technique. [5M] b) Derive the relationship between analog frequency and digital frequency in bilinear transformation method. [5M]	3	L3
17	Design an ideal high pass filter whose frequency response [10M] $H_d(e^{j\omega}) = 1$ for $\pi/4 \leq \omega \leq \pi$ $= 0$ for $\omega < \pi/4$. Find the values of h(n) for N=11. Find H(Z).plot the magnitude response.	4	L4
	OR		
18	a) What are the desirable characteristics of the windowing function to be satisfied in filter design? [5M] b) Explain outline the steps involved in design of FIR filter using windows. [5M]	4	L2
19	a) Explain the applications of Multirate Digital signal processing. [5M] b) Discuss in detail the down sampling with a neat diagram. [5M]	5	L3
	OR		
20	a)Explain the sampling rate conversion by L/M (or I/D) factor.[5M] b) Explain the finite word length effects in digital filters. [5M]	5	L4 L3