



R18 Regulation

Subject code:2P5DC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech V Semester Supplementary Examinations, December 2024

DIGITAL SIGNAL PROCESSING (ECE)

Maximum Marks: 70

Date:31.12.2024

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 is meant by zero state response of a system.	1	L1
2	Determine z-transform of the finite duration signal $x(n)=\{2,4,7,0,1\}$	1	L1
3	What is twiddle factor?	2	L1
4	Draw the basic butterfly diagram of DIT algorithm.	2	L1
5	Give the equation for the order and cut-off frequency of Butterworth filter.	3	L1
6	What are the parameters that can be obtained from the Chebyshev filter specification.	3	L1
7	What are the different types of filters based on impulse response?	4	L1
8	State the desirable characteristics of the window.	4	L1
9	Define Decimation process.	5	L1
10	What are the applications of Multirate signal processing.	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	Explain the block diagram of DSP and write its applications. [10M]	1	L2
OR			
12	A) Write a short note on realization of digital filters [5M] B) An LTI system is described by the equation [5M] $y(n) = x(n)+0.8x(n-1)+0.7x(n-2)- 0.45y(n-2)$. Determine the transfer function of the system. Sketch its poles and zeros on the Z-plane.	1	L2
13	A) Compare the computational complexity of FFT and DFT [5M] B) Distinguish between overlap-save and overlap-add methods [5M]	2	L2
OR			
14	Develop a 8 point DIF 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]	2	L2

15	A) For the given specifications design an analog Butterworth low pass filter [7M] $0.9 \leq H(j\Omega) \leq 1 \quad \text{for } 0 \leq \Omega \leq 0.2\pi$ $ H(j\Omega) \leq 0.2 \quad \text{for } 0.4\pi \leq \Omega \leq \pi$ B) Specify various types of filters available based on frequency selection. [3M]	3	L2
	OR		
16	Explain in detail about analog lowpass Chebyshev filters with respect to the pole locations. [10M]	3	L2
17	Design an ideal low pass filter whose frequency response [10M] $H_d(e^{j\omega}) = 1 \quad \text{for } -\pi/2 \leq \omega \leq \pi/2$ $= 0 \quad \text{for } \pi/2 \leq \omega \leq \pi$ Find the values of $h(n)$ for $N=11$. Find $H(z)$.	4	L2
	OR		
18	A) Distinguish between FIR and IIR filters [6M] B) Explain the following windows [4M] i) Rectangular window ii) Hanning window	4	L2
19	A) Write a short notes on Dead band effects. [5M] B) Why rounding is preferred to truncation in realizing digital filters. [5M]	5	L2
	OR		
20	Outline the process of Down sampling and derive its spectrum. [10M]	5	L2