



R20 Regulation

Subject code: 3P6DC

TKR COLLEGE OF ENGINEERING AND TECHNOLOGY

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

B.Tech VI Semester Supplementary Examinations, December 2024

DIGITAL SIGNAL PROCESSING
(ECE)

Maximum Marks: 70

Date: 02.01.2025

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	State 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	What are the applications of Multirate signal processing.	5	L1
10	What is the function of Address Generation Unit in DSP's	5	L1

Part-B

Answer All the following questions. (5X10M=50Marks)		CO	Bloom Tx
11	A) Apply your knowledge to explain in detail about the block diagram of DSP and its applications. [6M] B) Test for Linearity, Causality & Time variance and Invariance for the given systems described by [4M] i) $y(n) = n x(n)$ ii) $y(n) = x(-n)$	1	L3
OR			
12	A) Write the properties of ROC of Z-transform. [5M] B) An LTI system is described by the equation [5M] $y(n) = x(n) + 0.8x(n-1) + 0.7x(n-2) - 0.45y(n-2)$. Build the transfer function of the system. Sketch its poles and zeros on the Z-plane.	1	L3
13	A) Compare the computational complexity of FFT and DFT [5M] B) Distinguish between overlap-save and overlap-add methods [5M]	2	L3
OR			
14	Develop a 8 point DIF FFT algorithm build 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	L3

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	L5
	OR		
16	Explain in detail about design of analog lowpass Chebyshev filters with respect to the pole locations. [10M]	3	L5
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	L5
	OR		
18	Specify the Linear phase characteristics in FIR filter. [10M]	4	L3
19	Infer from the data addressing modes of TMS320C54XX Digital signal processors. [10M]	5	L4
	OR		
20	Categorize the basic operations involved in Multirate signal processing with examples. [10M]	5	L4