

Course Code:

BONAM VENKATA CHALAMAYYA INSTITUTE OF TECHNOLOGY & SCIENCE
(AUTONOMOUS)

III-B.TechII-Semester Regular Examinations (BR23), January – 2025-26
DIGITAL SIGNAL PROCESSING
(ECE)

Time: 3 hours

Max. Marks: 70

Question Paper consists of Part-A and Part-B
Answer ALL the question in Part-A and Part-B

PART-A (10X2 = 20M)

		Marks	CO	BL
1. a)	Define the energy and power signals.	(2M)	CO 1	1
b)	Show stability of the following: $h(n) = \left(\frac{1}{2}\right)^n u(n)$	(2M)	CO 1	1
c)	Define DFT and IDFT.	(2M)	CO 2	1
d)	Compare linear and circular convolution.	(2M)	CO 2	2
e)	How many multiplications and additions are required to compute N point DFT using radix-2 FFT	(2M)	CO 3	1
f)	Define signal flow graph.	(2M)	CO 3	1
g)	What is window? Why it is necessary?	(2M)	CO 4	1
h)	What is warping effect? what is effect on magnitude and phase response?	(2M)	CO 4	1
i)	What are the factors that influence the selection of DSP Processors	(2M)	CO 5	1
j)	What are the different on-chip peripherals in TMS320C5X DSP processor	(2M)	CO 5	1

PART-B (5X10 = 50M)

2a.	Determine the natural response of the system described by difference equation $y(n) + 2y(n-1) + y(n-2) = x(n) + x(n-1)$ with initial conditions $y(-1) = y(-2) = 1$	10M	CO 1	5
(OR)				
3a.	Classify discrete-time systems. Explain with Examples	5M	CO 1	4
b.	Determine convolution of the signals $x(n) = a^n u(n)$ and $h(n) = b^n u(n)$	5M	CO 1	5
4a.	Determine the impulse response of the system described by difference equation $y(n) - 3y(n-1) - 4y(n-2) = x(n) + 2x(n-1)$ using Z-Transform.	10M	CO 2	5
(OR)				
5a.	Determine 4-point IDFT of the sequence $Y(K) = \{1, 0, 1, 0\}$	5M	CO 2	5
b.	Determine the inverse z transform of $X(z) = \frac{z(z^2 - 4z + 5)}{(z-3)(z-1)(z-2)}$ for the ROC i) $ z > 3$ ii) $ z < 1$ iii) $2 < z < 3$	5M	CO 2	5

6a.	What is the importance of FFT algorithm? Determine 4-point DFT of the sequence of $x(n) = \{0,1,2,3\}$ using DIT FFT algorithm.	5M	CO 3	5
b	Determine 8-point DFT of the sequence $x(n) = \{1,1,1,1,1,1,0,0\}$ using radix-2 DITFFT algorithm	5M	CO3	5
(OR)				
7a.	What are the various structures of IIR Filter design.	5M	CO 3	5
b.	Determine the direct form-1 and Direct form-2 realization of the following $y(n) = 0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$	5M	CO 3	5
8a.	Explain the concept of IIR Filter design by Approximation of derivative with necessary equations	5M	CO 4	5
b	The system function of analog filter is given by $H_a(s) = \frac{1}{s+2}$ Determine $H(z)$ Using derivative Approximation method.	5M	CO4	5
(OR)				
9a.	Explain the steps involved in design of FIR filter using frequency sampling method.	5M	CO 4	5
b	Design a low pass Butterworth filter having a 3-dB cutoff frequency of 1.5kHz and an attenuation of 40 dB at 3 kHz.	5M	CO4	5
10a.	Draw the block diagram of VLIW architecture and explain	5 M	CO 5	5
b.	List out the on-chip peripherals in programmable DSP's and Explain any two of them in detail	5 M	CO 5	4
(OR)				
11a.	What is meant by instruction pipelining? Explain with an example.	5M	CO 5	5
b.	Explain the differences between Von Neumann and Harvard architectures. Which architecture is preferred for DSP applications? Why?	5M	CO 5	5

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