Code No.: R22EC602PC

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–II–Semester End Examinations (Supply) - December- 2025
DIGITAL SIGNAL PROCESSING
(ECE)

[Time: 3 Hours] **[Max. Marks: 60]**

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 10 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A **(10 Marks)**

1. a)	Define linear shift invariant system.	[1M]
b)	Define causal system and non causal system.	[1M]
c)	Write the formula for N point IDFT.	[1M]
d)	Why FFT is preferred to DFT?	[1M]
e)	What are the disadvantages of impulse invariant method?	[1M]
f)	What are the properties of bilinear transformation?	[1M]
g)	Write the important features of IIR filters.	[1M]
h)	What are finite word-length effects?	[1M]
i)	What are the applications of Digital signal processor?	[1M]
j)	Define sampling theorem	[1M]

PART-B **(50 Marks)**

2.	For the given system y(n)=x(n)-2x(n-1) +x(n-2), determine the magnitude and phase response.	[10M]
	OR	
3.a)	Verify the system y(n) = 2 / [x(n) + 3] for its linearity time invariance, causality and stability.	[5M]
b)	Obtain the frequency response of the system; Y(n) = -2y(n-1) + 3 y (n-2) + 4 x(n) and plot.	[5M]
4.	Find the 8-point DFT of the following Sequences by using DIT radix -2 FFT algorithm: x(n) = {1,1,1,1,0,0,0,0}.	[10M]
	OR	
5.	Find the DFT of the Sequence x(n) defined by x(n) = 1 for $2 \le n \le 6$ = 0 for n = 0, 1 and 7. Use DIF radix-2 FFT algorithm. Give all intermediate results.	[10M]
6.	Design a Butterworth IIR low pass filter with the following specifications: passband ripple αp =1 dB, stop band attenuation αs =40 dB, pass band edge frequency is 2 KHz, stop band edge frequency 10 KHz, Sampling frequency is 25 KHz. Use the bilinear transformation technique.	[10M]
	OR	
7.	Design a Chebyshev filter with αp=2.5dB, Ωp=20 rad/sec, αs=30dB, Ωs=50rad/sec.	[10M]
8.	Design an ideal LPF, whose response is $H_d(e^{jw}) = e^{j3w}$ $0 \le \omega \le \pi / 3$ = 0 otherwise. Using a rectangular window, N=5	[10M]
	OR	
9.a)	Compare IIR and FIR filters.	[5M]
b)	What is an aliasing effect?	[5M]
10.a)	Explain the spectrum of down sampling.	[5M]
b)	Write the applications of multi rate signal processing.	[5M]
	OR	
11.a)	Draw and explain the spectrum of a down sampler used in decimator.	[5M]
b)	State and prove identities used in Multirate signal processing related to decimator.	[5M]

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