Code No.: EC503PC | R20 | H.T.No. | | | 8 | R | | | | | |

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Supply) - June- 2024
DIGITAL SIGNAL PROCESSING
(ECE)

[Time: 3 Hours] [Max. Marks: 70]

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 20 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.

PART-A (20 Marks)

1. a)	Determine fundamental Time period of the signal x(n) =sin(0.02 πn).	[2M]
b)	Test the causality of the system whose impulse response is given by $h(n)=(1/2)^n u(n)$	[2M]
c)	Distinguish between DFT and radix- 2 FFT algorithms.	[2M]
d)	Write the expression for twiddle factor.	[2M]
e)	Compare between Butterworth with Chebychev filters.	[2M]
f)	What is warping effect?	[2M]
g)	What is the use of anti-aliasing filter?	[2M]
h)	Write the expression for Bilinear Transformation?	[2M]
i)	How aliasing can be reduced in down sampling?	[2M]
j)	How to prevent overflow in design of digital filters?	[2M]

PART-B (50 Marks)

2. Determine the transfer function of the system given by the difference equation [10M]

$y(n) = -\frac{1}{2}y(n-1)+x(n) -\frac{1}{2}x(n-1)$ for $n\geq 0$

OR

3. Check for following systems is linear, causal, time in variant. [10M]

i) $y(n) = x(2n)+x(n-3)$

ii) $y(n) = \cos(x(2n))$

4. Compute the DFT of the following sequence using Radix -2, DIT-FFT algorithm [10M]
x[n] = [1, 1, 1, 1, 0, 0, 0, 0,]

OR

5. Compute IDFT of the sequence X(K) = [7, -0.707-j0.707, -j, 0.707-j0.707] using DIT FFT algorithm [10M]

6. A digital low pass filter is required to meet the following specification [10M]
Passband ripple:≤ 0.5 dB
Passband edge :1.2kHz
Stopband attenuation :≥10 dB
Stopband edge :3KHz
Sample rate:2kHz
The filter is to be Chebychev design by performing a bilinear transformation on an analog system function.

OR

7. Convert the analog filter with system function $H(S) = \frac{s+0.1}{(s+0.1)^2+9}$ into a digital IIR filter by means of the impulse invariance method. [10M]

8. Compare IIR and FIR filters. [10M]

OR

9. Realize the given system in direct form-I $y[n] = 0.7y[n-2] - 0.25y[n-5] + x[n] + 0.4\,x[n-3]$ [10M]

10. Explain the Decimation by a Factor D. [10M]

OR

11. What are limit cycles? and also Explain in detail about finite word length effects in digital filters. [10M]

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