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

CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
III–B.TECH–I–Semester End Examinations (Regular) - January- 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)	What is meant by zero padding?	[2M]
b)	What is meant by causal system?	[2M]
c)	Distinguish between DFT and Radix-2 FFT algorithm	[2M]
d)	What is the value of twiddle factor W_8^2.	[2M]
e)	What is Warping effect?	[2M]
f)	What is Gibbs phenomenon?	[2M]
g)	Explain the Rectangular window.	[2M]
h)	Compare between Butterworth and Chebychev filters.	[2M]
i)	Define the interpolator.	[2M]
j)	How to prevent overflow in design of digital filters?	[2M]

PART-B **(50 Marks)**

2. Determine the Impulse response of the system given by the difference equation. [10M]

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

OR

3. Check for following systems is linear, time invariant. [10M]

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

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

4. Draw the signal flowgraph structure of radix -2 DIT FFT algorithm for N=8. [10M]

OR

5. Draw the signal flowgraph structure of the radix-2 DIF FFT algorithm for N=8 [10M]

6. Design a digital low pass Chebychev filter for the following specification [10M]
Passband ripple:$\leq$ 0.5 dB,
Passband edge :1.2kHz,
Stopband attenuation :$\geq$40 dB,
Stopband edge :2KHz,
Sample rate:8kHz,
The filter is to be design by performing a bilinear transformation on an analog system function.

OR

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

8. Prove that an FIR filter has linear phase if the unit sample response satisfies the condition $h(n) = \pm h(M-1-n)$, $n = 0,1,\ldots M-1$. Also discuss symmetric and anti-symmetric cases of FIR filter. [10M]

OR

9. Realize the given system in direct form-I. [10M]
$y[n] = 0.5y[n-1] - 0.25y[n-2] + x[n] + 0.4\, x[n-1]$.

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

OR

11. Explain in detail about zero limit cycle oscillations in digital filters. [10M]

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