Code No: R18A0414 **R18**

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech II Semester Supplementary Examinations, April 2023

Digital Signal Processing

(ECE)

Roll No										

Time: 3 hours **Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

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SECTION-I

1 a) Determine the frequency response of the system given by. [7M]
$y(n) = x(n) - x(n-1) + x(n-2)$.

b) Determine whether the following system is: i) Linear ii) Causal iii) Stable, and iv) Time invariant. $y(n)=\log_{10} x(n)$ Justify your answer. [7M]

OR

2 a) Develop the direct form 1 and 2 forms of the following transfer functions. [7M]

$$H(z) = \frac{(3+5z^{-1})(0.6+3z^{-1})}{(1-2z^{-1}+2z^{-2})(1-z^{-1})}$$ [7M]

b) What is the significance of convolution? Explain

SECTION-II

3 a) Find the DFT of the following sequence using DIF FFT? [8M]
x(n)={ 1,2,3,5,5,3,2,1 }.

b) Find the inverse FFT of X[k] = [10, -2+j2, 4, -2-j2]. [6M]

OR

4 a) Compute the coefficients of the Fourier series of the periodic sequence given below [8M]

$$x(n) = \sin\left(\frac{2\pi n}{N}\right), for\ N = 20$$

b)Compute the 8-point DFT of the following sequence using radix-2 DITFFT algorithm: x(n)={ 2,2,2,2,1,1,1,1 }. [6M]

SECTION-III

5 a) Explain bilinear transformation method. [7M]

b) Compare and Contrast Butterworth and Chebyshev approximations. [7M]

OR

6 Design a Butterworth digital filter using bilinear transformation for the following specifications [14M]

$0.9 \le |H(w)| \le 1;\ 0 \le w \le \pi/2$

$|H(w)| \le 0.2;\ 3\pi/4 \le w \le \pi$

SECTION-IV

7 Design an ideal high pass filter with a frequency response [14M]

$$Hd(ejw) = 1 \text{ for } \pi/4 \leq |w| \leq \pi$$
$$= 0 \text{ for } |w| \leq \pi/4$$

Find the values of h(n) for N = 11 using Hamming window. Find H (z) and determine the magnitude response.

OR

8 a) What are the basic structures of FIR systems? Explain [8M]

b) What are the effects of windowing? Comparing various windowing techniques. [6M]

SECTION-V

9 a) Explain the up – sampler with a neat diagram. [8M]

b) Explain about sampling rate conversion [6M]

OR

10 a) What is Multi Rate Signal Processing? Explain any two applications of multirate signal processing. [8M]

b) What is the difference between single-rate and multi-rate systems? Explain with examples. [6M]

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