R20

Code No: R20A0409

MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY

(Autonomous Institution – UGC, Govt. of India)

III B.Tech I Semester Supplementary Examinations, May/June 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***	Define and Check the stability of the given LTI system $h(n)=a^n$ for $0<n<11$.	**[6M]**
	B	Determine whether the following systems are linear, causal or not (a) $y(n) = \log_{10}(\|x(n)\|)$	**[4M]**
		(b) $y(n) = x(n) + x(n+1)$	**[4M]**
		OR	
2	***A***	Determine the impulse response of the system described by the difference equation, $y(n)-3y(n-1)-4y(n-2)=x(n)+2x(n-1)$ using z-transform	**[7M]**
	B	Obtain the Direct form-II realization of the system $y(n) = -0.1y(n-1) + 0.2y(n-2) + 3x(n) + 3.6x(n-1) + 0.6x(n-2)$	**[7M]**

SECTION-II

3	***A***	Compute the DFT of the 3-point sequence x[n] = {2,1,2}.	**[6M]**
	B	A sequence y(n) is constructed from a finite duration sequence x(n) of length 8 samples in the following manner Y(n)=x(n/2) ; n is even =0 ; n is odd Determine Y(k) in terms of X (k) where Y(k) and X(k) are the DFTs of y(n) and x(n) respectively.	**[8M]**
		OR	
4	***A***	Explain how DFT can be obtained by sampling DFS for a given sequence.	**[7M]**
	B	Develop a Radix-2, DIF/FFT algorithm for an 8-point sequence.	**[7M]**

SECTION-III

5		A digital filter low pass filter is required to meet the following specifications. Passband attenuation ≤ 1 db Passband edge 4 Khz Stopband attenuation ≥ 40 db Stopband edge 8 Khz Smpling rate 24 Khz The filter is to be designed by performing a bilinear transformation on an anlaog function. Design a butterworth filter and realize it.	**[14M]**
		OR	
6		Design a Butterworth digital IIR low pass filter using bilinear transformation by taking T=0.3 sec, to satisfy the following specifications: $0.45 \le \|H(e^{jw})\| \le 1.0$; for $0 \le w \le 0.675\ \pi$ $\|H(e^{jw})\| \le 0.15$; for $0.8\ \pi \le w \le \pi$.	**[14M]**

SECTION-IV

7		Design a low pass filter for a seven stage with cutoff frequency at 300 Hz if Ts=1 msec. Use hanning window.	**[14M]**
		OR	
8	***A***	Design a linear phase FIR high pass filter using rectangular window, with a cut off frequency, Wc=0.48 π rad/sec and N=5.	**[10M]**
	B	Compare window functions.	**[4M]**

SECTION-V

9		Discuss the process of Interpolation by a factor I with a neat block diagram, example and also give few applications of Multirate signal processing.	**[14M]**
		OR	
10		Discuss the process of Decimation by a factor L with a neat block diagram, example and also give few applications of Multirate signal processing	**[14M]**

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