



RV College of Engineering

Mysore Road, RV Vidyaniketan Post,
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UPEA Approved

Department of Electronics & Communication Engineering

		USN	1	R	V			E	C		
Date : 19-03-24		Test- 3				Maximum Marks : 50					
Semester : V		UG				Duration : 1½ Hrs					
Course :Principal of Communication and Signal Processing						Course Code :21EC52					
Sl. No.	Questions								M	BT	CO
1a.	Determine the system function H(z) of the lowest order Chebyshev filter that meets the following specifications: i. Use bilinear Transformation ii. 3dB ripple in the passband $0 \leq w \leq 0.3\pi$ iii. At least 20dB attenuation in the stopband $0.6\pi \leq w \leq \pi$								6	3	1
1b	What is frequency warping effect in digital IIR filter?								4	2	1
2a	Convert the analog filter with system function $H(s) = \frac{(s+0.1)}{(s+0.1)^2+9}$ into a digital IIR filter using bilinear transformation. The digital filter is to have a resonant frequency of $w_r = \pi/4$.								5	3	2
2b	i. Realize an FIR filter with impulse response h(n) given by $h(n) = 0.5^n [u(n) - u(n-4)]$ using direct form. ii. Draw the Cascade form of structure for an FIR filter given by following equation $H(z) = [1 + 0.5z^{-1} + z^{-2}] [1 + 0.25z^{-1}]$								5	2	2
3.	An IIR digital low pass filter is required to meet the following specifications: Passband ripple ≤ 3.01 dB Passband edge frequency: 500 Hz Stopband attenuation ≥ 15 dB Stopband edge frequency: 750 Hz The filter is to be designed by performing bilinear transformation on an analog system function, use Butterworth prototype. Also plot the complete magnitude frequency response and obtain the difference equation. Sample rate: 2 KHz								10	3	1
4	A low pass filter has the desired frequency response $H_d(w) = \begin{cases} e^{-j3w} & 0 \leq w \leq \frac{\pi}{2} \\ 0 & \frac{\pi}{2} \leq w \leq \pi \end{cases}$ Determine h(n) based on frequency sampling technique. N=7								10	3	1
5a	A low pass filter is designed to obtain the following frequency response: $H_d(w) = \begin{cases} e^{-j3w} & w \leq \frac{3\pi}{4} \\ 0 & \frac{3\pi}{4} \leq w \leq \pi \end{cases}$ Calculate the filter coefficient $h_d(n)$ and determine the frequency response of the FIR filter if hamming window is used.								7	3	1
5b	Compare the performance of Butterworth filter and Chebyshev filter. Mention the application in which they are preferred choice.								3	2	1

BT-Blooms Taxonomy, CO-Course Outcomes, M-Marks

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		Particulars	CO1	CO2	CO3	CO4	L1	L2	L3	L4	L5	L6
Marks Distribution	Test	Max Marks	40	10				12	38			
