Scheme Of Evaluation
Internal Assessment Test II – Dec 2024

Sub:	DIGITAL SIGNAL PROCESSING							**Code:**	BEC502
Date**:**	13/12/2024	Duration:	90mins	Max Marks:	50	**Sem:**	V	**Branch:**	ECE

Note: Answer Any Five Questions

Question #		**Description**	**Marks Distribution**		**Max Marks**
1		Compute the 6-point DFT of $x[n] = [1,2,3,4]$. Plot magnitude spectrum and phase spectrum. • DFT Computation • Magnitude Spectrum • Phase Spectrum	6 M 2 M 2 M	10 M	10 M
2		Compute the 4-point circular convolution of $x[n] = [1,2,3]$ and $h[n] = [3,2,4]$ using DFT-IDFT approach [Stockham's method]. Verify the result using matrix method. • Circular Convolution • Verify using matrix method	6 M 4 M		10 M
3		State and prove the following properties of DFT. i) Circular Time Shift ii) Circular Frequency Shift iii) Parseval's Theorem	4 M 3 M 3 M	10 M	10 M
4		An LTI system has the impulse response $h[n] = [1,2,3]$. Find the output of the system for the input $x[n] = [1,2,3,2,1,4,3,2,1,3,2]$ using overlap-add method. Use 6-point circular convolution. Convolution block outputs Final Overlap Add method output	6 M 4 M	10 M	10 M
5		Compute the 8-point DFT of $x[n] = [1,2,3,4,4,3,2,1]$ using DIT-FFT. Stage 1 Stage 2 Stage 3	2 M 4 M 4 M	10 M	10 M
6		An LTI system has the transfer function $H(z) = \frac{2z^3 - 3z^2 + z - 1}{z^4 - 2z^3 + 3z^2 - 4z + 2}$		10 M	10 M

		Implement the system using Direct Form-I (DF-I) and Direct Form-II (DF-II). Direct Form I Direct Form II	5 M 5 M		
7	a)	Design an FIR filter to meet the following desired frequency response. $$H_d(\omega) = \begin{cases} e^{-j3\omega} & for\ |\omega| \leq \frac{\pi}{4} \\ 0 & otherwise \end{cases}$$ Use rectangular window in your design. $$h(n) = h_d(n)\, w(n)$$ $h_d(n)$ evaluation $h(n)$ computation	 6 M 4 M	10 M	10 M
8		Design an analog Butterworth filter that has a passband attenuation of 2 dB at 10 rad/s and stopband attenuation of 30 dB at 50 rad/s. Order N computation Poles computation $s_k(n)$ Analog Filter Transfer Function $H_a(s)$	 3 M 4 M 3 M		