Time:- 3 hrs.

Maximum Marks:- 80

N. B.
1. Q.1 is compulsory.
2. Answer any **three** out of the remaining five questions.
3. Figures to the right indicate marks.
4. Answer to the questions should be grouped and written together.

1.a.	What are the limitations of Fourier transform? Explain with two examples at least. Explain how wavelet is dual of the Fourier transform?	5
b.	What are the Frequency Domain operations in Musical Sound Processing?	5
c.	Explain the Periodogram in detail?	5
d.	Explain Steepest Descent Algorithms	5
2.a	Discuss how Wavelet Transform can be used for signal denoising.	10
b.		10
3.a.	Prove the Wiener Hopf Equation and derive the expression for MSE and Minimum value of MSE	10
b.	Derive the RMS Algorithm and explain its advantages over LMS.	10
4.a	Derive the LMS Algorithm ans explain its limitations.	10
b.	Explain the Yule Walker method for AR models	10
5.a.	Explain the system for Ocular Artifact removal system along with the block diagram.	10
b.	Draw a neatly labeled ECG signal. Explain the template matching techniques of QRS separation in an ECG signal with the help of a block diagram.	10
6.a.	Explain adaptive channel equalization and adaptive echo cancellation	10
b.	i) What do you mean by Mother wavelet? What are it's properties?	05
	ii) For a mother wavelet at scale j and translation k given as:	05

$$\psi_{jk}(t) = 2^{j/2}\psi(2^j t - k)$$

sketch the Haar mother wavelet families for four different scales, j = 0; 1; 2; 3, for a period of 1 second.

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