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Contents of Module of Advancements in Signal Processing and Optimization Techniques

S.No.	Module Name	Topics
1.	**Adaptive Signal Processing**	Fundamentals of Signal Processing, Introduction to Adaptive Systems, Minimum Mean-Square Error, Wiener-Hopf Equation, Error Performance Surface, LMS algorithm, Convergence of weight vector, Learning Curve, Least Mean Square(LMS) Algorithm, Recursive Least Square (RLS) Algorithm, Direct Modelling or System Identification, Inverse Adaptive Modelling (Equalization), Adaptive Noise Cancellation, Adaptive filters for time series and stock market prediction, Biomedical Applications
2.	**Applications of Transformations to Signal**	Fourier Transform, Short Time Fourier Transform, Multi-resolution Analysis, Wavelet Transform, Discrete Wavelet Transform (DWT), Sub-band Coding for DWT, DWT for Image processing Applications, Stockwell Transform and its Applications
3.	**Classical Optimization and Unsupervised Learning Techniques**	Basics of Optimization, Constrained Optimization, Linear Programming, Graphical Method, Dual Problems, Classification and Clustering, K-Means Clustering, Density Based Approaches for Clustering Applications
4.	**Evolutionary and Nature Inspired Optimization Techniques**	Introduction to Nature Inspired Optimization, Genetic Algorithms, Particle Swarm Optimization and its variants, Ant Colony Optimization, Honey Bee Optimization, Gray Wolf Optimization, Spider-Monkey Optimization, Social Spider Optimization and their applications.
5.	**Multi-Objective Optimization Techniques**	Introduction to Multi-Objective Optimization, Non-dominated Sorted Genetic Algorithm (NSGA-II), Multi-Objective Particle Swarm Optimization (MOPSO) Applications.

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