

Year & Sem: E1S2	Course Code: EC4505	Course Name: Adaptive signal processing	No. of Credits: 4	L 2	T&PS 2	P 0
UNIT –I: Introduction to Adaptive Systems: Adaptive Systems: Definitions, Characteristics, Applications, Example of an Adaptive System. The Adaptive Linear Combiner - Description, Weight Vectors, Desired Response Performance function - Gradient & Mean Square Error. UNIT –II: Development of Adaptive Filter Theory & Searching the Performance surface: Introduction to Filtering - Smoothing and Prediction – Linear Optimum Filtering, Problem statement, Principle of Orthogonality - Minimum Mean Square Error, Wiener- Hopf equations, Error Performance - Minimum Mean Square Error. Searching the performance surface – Methods & Ideas of Gradient Search methods - Gradient Searching Algorithm & its Solution - Stability & Rate of convergence - Learning Curves. UNIT –III: Steepest Descent Algorithms: Gradient Search by Newton’s Method, Method of Steepest Descent, Comparison of Learning Curves. UNIT –IV: LMS Algorithm & Applications: Overview - LMS Adaptation algorithms, Stability & Performance analysis of LMS Algorithms - LMS Gradient & Stochastic algorithms - Convergence of LMS algorithm. Applications: Noise cancellation – Cancellation of Echoes in long distance telephone circuits, Adaptive Beam forming. UNIT –V: Kalman Filtering: Introduction to RLS Algorithm, Statement of Kalman filtering problem, The Innovation Process, Estimation of State using the Innovation Process- Expression of Kalman Gain, Filtering Examples using Kalman filtering. References/Text Books: 1. Adaptive Signal Processing - Bernard Widrow, Samuel D.Stearns, 2005, PE. 2. Adaptive Filter Theory - Simon Haykin-, 4th Ed., 2002, PE Asia. 3. Optimum signal processing: An introduction - Sophocles. J. Orfamadis, 2nd Ed., 1988, McGraw-Hill, New York 4. Adaptive signal processing-Theory and Applications - S.Thomas Alexander, 1986, Springer – Verlag. 5. Signal analysis – Candy, Mc Graw Hill Int. Student Edition 6. James V. Candy - Signal Processing: A Modern Approach, McGraw-Hill, International Edition, 1988. Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations. Video Lectures (Web Links): 1. 2. Study Materials (Web Links): 1.						