ELECTRICAL ENGINEERING

Optimal control

Type of Course	:	New
Course Snapshot	:	Elective / UG, PG
	:	Research Engineers, Scientists
Pre-requisites	:	Advanced Control System.
Course Duration	:	20 hours / 8weeks
Industry Support	:	DRDO, ISRO and Engineering Institutions etc.

COURSE OUTLINE:

The optimization techniques can be used in different ways depending on the approach (algebraic or geometric), the interest (single or multiple), the nature of the signals (deterministic or stochastic), and the stage (single or multiple). The main objective of optimal control is to determine control signals that will cause a process (plant) to satisfy some physical constraints and at the same time extremize (maximize or minimize) a chosen performance criterion (performance index or cost function).

INSTRUCTOR:

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ABOUT INSTRUCTOR:

Prof. Barjeev Tyagi received the PhD in Electrical Engineering, IIT-Kanpur, 2005 and M. Tech Electrical Engineering (Control System) from IIT-Kharagpur in the year 2000. Prior to these he completed his B. E. Electrical Engineering from IIT-Roorkee (Formally Univ. of Roorkee) in 1987. Presently he is serving as Associate Professor in EED, IIT-Roorkee since 2007. His research interests include Control System Analysis and Design, Control application in Power System, Distributed Generation and Control.

COURSE PLAN:

Week 1 : Introduction and Performance Index,Basic Concept of calculus of variation,The basic variational problem,Fixed end point problem,Free end point problem

Week 2 : Free end point problem (Continued),Optimum of a function with conditions,Lagrange Multiplier Method

Week 3 : Optimum of a functional with conditions,Variational Approach to Optimal Control Systems,Linear Quadratic Optimal Control Systems

Week 4 : Linear Quadratic Optimal Control Systems (Contnued),Optimal Value of Performance Index, Infinite Horizon Regulator Problem

Week 5 : Infinite Horizon Regulator Problem (Continued),Analytical Solution of Matrix Differential Riccati Equation (State Transition Matrix Approach,Analytical Solution of Matrix Differential Riccati Equation (Similarity Transformation Approach),Frequency Domain Interpretation of LQR(Linear Time Invariant System)

Week 6 : LQR with a Specified Degree of Stability,Inverse Matrix Riccati Equation,Linear Quadratic Tracking System,Discrete-Time Optimal Control Systems

Week 7 : Discrete-Time Optimal Control Systems (Continued),Matrix Discrete Riccati Equation Analytical Solution of Matrix Difference Riccati Equation

Week 8 : Optimal Control Using Dynamic Programming,The Hamilton-Jacobi-Bellman (HJB) Equation,LQR System Using H-J-B Equation,Time Optimal Control System(Constrained Input)