GUJARAT TECHNOLOGICAL UNIVERSITY

Master of Engineering
Subject Code: 3732906
Semester – III
POWER ELECTRONICS
Subject Name: OPTIMAL AND ADAPTIVE CONTROL

Type of course: Program Elective IV

Prerequisite: Knowledge of basics of control systems, linear systems along with design aspects for engineering problems, matrix theory**.**

Rationale: PG Students of Power Electronics Engineering need to possess good understanding of the fundamentals and applications of control System as it is an important in field of engineering**.**

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	Basics of the Optimal Regulator, standard regulator problem, Hamilton –Jacobi equation, tracking systems.	**7**
2	Regulator Systems with a Classical Control Interpretation, Asymptotic Properties and Quadratic Weight Selection.	**8**
3	State Estimator Design, System Design Using State Estimators, the separation theorem and performance calculation	**7**
4	Classical and linear quadratic methods, Frequency Shaping and Digital Controllers with filters.	**7**
5	Adaptive Control: Introduction, Basic Adaptive Control Schemes & Applications, Parameter Adaptation Algorithms for Deterministic & Stochastic Environment	**8**
6	Direct Adaptive Control & Indirect Adaptive Control systems	**8**

Reference Books:

1 Optimal Control -Linear Quadratic Methods by Brian D. O. Anderson John B. Moore,(PHI)

2 Adaptive Control -Algorithms, Analysis and Applications by Ioan Doré Landau , Rogelio Lozano , Mohammed M'Saad , Alireza Karimi (Springer)

3 A.P. Sage, "Optimum Systems Control", Prentice Hall, 1977

4 Control system principles and design by M.Gopal (McGraw Hill)

Course Outcomes:

Sr. No.	CO statement	Marks % weightage
CO-1	Knowledge in the mathematical area to apply the same for solving optimal control problems.	20
CO-2	Problem formulation, performance measure of optimal control problems.	20
CO-3	Mathematical treatment of optimal control problems	20
CO-4	Acquire knowledge on solving optimal control design problems by taking into consideration the physical constraints on practical control systems.	20
CO-5	To obtain optimal solutions to controller design problems taking into consideration the limitation on control energy in the real practical world.	20

Tutorials will be based on contents of syllabus.

List of Open Source Software/learning website:

1. https://www.scilab.org/
2. https://www.nptel.ac.in
3. https://www.mathworks.com/