PX5091 CONTROL SYSTEM DESIGN FOR POWER ELECTRONICS

DETAILED SYLLABUS

OBJECTIVES

To explore conceptual bridges between the fields of Control Systems and Power Electronics

To Study Control theories and techniques relevant to the design of feedback controllers in Power Electronics**.**

UNIT I MODELLING OF DC-TO-DC POWER CONVERTERS

Modelling of Buck Converter, Boost Converter, Buck-Boost Converter, Cuk Converter, Sepic Converter, Zeta Converter, Quadratic Buck Converter, Double Buck-Boost Converter, Boost-Boost Converter General Mathematical Model for Power Electronics Devices**.**

UNIT II SLIDING MODE CONTROLLER DESIGN

Variable Structure Systems. Single Switch Regulated Systems Sliding Surfaces, Accessibility of the Sliding Surface Sliding Mode Control Implementation of Boost Converter, Buck-Boost Converter, Cuk Converter, Sepic Converter, Zeta Converter, Quadratic Buck Converter, Double Buck-Boost Converter, Boost-Boost Converter.

UNIT III APPROXIMATE LINEARIZATION CONTROLLER DESIGN

Linear Feedback Control, Pole Placement by Full State Feedback, Pole Placement Based on Observer Design, Reduced Order Observers, Generalized Proportional Integral Controllers, Passivity Based Control, Sliding Mode Control Implementation of Buck Converter, Boost Converter, Buck-Boost Converter**.**

UNIT IV NONLINEAR CONTROLLER DESIGN

Feedback Linearization Isidori's Canonical Form, Input-Output Feedback Linearization, State Feedback Linearization, Passivity Based Control, Full Order Observers, Reduced Order Observers.

UNIT V PREDICTIVE CONTROL OF POWER CONVERTERS

Basic Concepts, Theory, and Methods, Application of Predictive Control in Power Electronics, AC-DC-AC Converter System, Faults and Diagnosis Systems in Power Converters.

REFERENCES

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4. Enrique Acha, Vassilios Agelidis, Olimpo Anaya, TJE Miller, “Power Electronic Control in Electrical Systems”, Newnes, 2002
5. Marija D. Aranya Chakrabortty, Marija , “Control and Optimization Methods for Electric Smart Grids”, Springer, 2012.