

## DIGITAL CONTROL OF POWER ELECTRONICS

Hours Per Week :

L	T	P	C
4	1	1	4

WA/RA	SA	SSH	S	BS

### Course Description and Objectives:

This course deals with the concept of digital principles, digital instrumentation setup to control various power electronics based drives and the recent trends in digital instrumentation.

### Course Outcomes:

Upon successful completion of this course, the student able to:

- a. have basic concepts of Digital Signal Processing.
- b. have better knowledge about DSP controllers in converters applications .
- c. have better knowledge about DSP controllers in induction motors and other drives.

### SKILLS ACQUIRED:

- ✓ Able to understand analysis of basic concepts of digital controller
- ✓ Able to understand realization of PWM signals using DSP.
- ✓ Able to acquire a skill of understanding control of converters using DSP.
- ✓ Able to acquire a skill of understanding control of drive using DSP.

### ACTIVITIES:

1. Design of digital controller for buck DC-DC converter for battery charging application.
2. Design of digital inverter for UPS.
3. Design of digital voltage regulator .

**UNIT – I****L- 10**

**DSP Controllers:** Introduction to TMS DSP controllers – C2xx DSP CPU and instruction set – Mapping external devices to the C2xx core and the peripheral interface – General purpose Input/Output functionality – Interrupts – ADC – Event Managers.

**UNIT – II****L- 10**

**Digital PWM generation schemes:** Signal analysis, Digital PWM generation schemes, Realization of different PWM's using DSP's.

**UNIT – III****L- 10**

**DSP BASED Control of Converters:** DSP based – Implementation of Switched mode regulators–Boost –Buck-Boost, Flyback and Forward converters.

**UNIT – IV****L- 10**

**DSP BASED Control of Induction motors :** Park and Clarke's transformations. Space Vector Pulse Width Modulation. DSP-based vector control of induction motors

**UNIT – V****L- 10**

**DSP BASED Control of Special Machines :** DSP based control of stepper motors, DSP-Based control of permanent magnet brushless DC machines,DSP-based control of permanent magnet synchronous machines

**TEXT BOOKS:**

- 1.Hamid Toliyat and Steven Campbell, “DSP-Based Electromechanical Motion Control”, CRC Press, 2011.
- 2.P.C.Krause, Oleg Wasynczuk, Scott D.Sudhoff, “Analysis of Electrical Machinery and Drive Systems”, 2nd Edition, Wiley India,2010
- 3.Chee-Mun Ong, “Dynamic Simulation of Electric Machinery using Matlab / Simulink”, Prentice Hall,1998.

**REFERENCES:**

- 1.Sanjit K. Mitra, “Digital Signal Processing”, Tata McGraw Hill, 4thed. 2007.
- 2.Douglas Elliott F., Hand book of “Digital Signal proceedings: Engineering applications”, Academic Press, 1987.
- 3.Texas and Analog Devices - Reference Manual