I Year II Semester	L	Р	С
Code: 17PE201	4	0	3

SWITCHED MODE POWER CONVERSION (Common to PE, P&ID, PE&ED, PE&D, PE&S, EM&D, PE&PS)

Perquisites: Concepts of electrical circuit analysis and power electronics.

Course Educational Objectives:

- 1. To understand the control operation of non-sinusoidal DC-DC converters.
- 2. To understand the basic operation of resonant converters.
- 3. To understand the control operation of isolated DC-DC converters.
- 4. To understand the control schemes of DC-DC converters and designing of magnetic components.
- 5. To understand the modeling and control design of switch mode conversion based online a relation.
- 6. To understand how to analyses the switch mode converters using small-signal analysis.

UNIT-I: Non-isolated switch mode converters:

Control of DC-DC converters, Buck converters, Boost converters, Buck-Boost converter, CUK Converter, Converter realization with non-ideal components.

UNIT-II: Resonant converters:

Basic resonant circuit concepts, series resonant circuits, parallel resonant circuits, zero current switching Quasi-resonant buck converter, zero current switching Quasi-resonant boost converter, zero voltage switching Quasi-resonant buck converter, zero voltage s

UNIT-III: Isolated switch-mode converters:

Forwarded converter, fly back converter, Push-pull converter, half-bridge converter, full bridge converter

UNIT-IV: Control schemes of switching converters:

Voltage-mode control, Current-mode control, control scheme for resonant converters, proportional integral controller. Magnetic design consideration: Transformers design, DC inductor and capacitor design.

UNIT-V: Modeling & Control design based on linearization:

Formulation of averaged models for buck and boost converters average circuits models, small – signal analysis and linearization. Control design based on linearization: Transfer function of converters, control design, large signal issues in voltage-mode & current mode control.

Course Outcomes:

After completion of this course the students will be able to:

- Analyse the control operation of non-isolated switch mode converters.
- Analyse the operation of resonant converters and soft switching.
- Analyse the operation of isolated switch mode converters.
- Analyse the control schemes for resonant converters and design of magnetic components.
- Analyse the design of non-isolated switch mode converters based on linearization.
- Analyse the switch mode converters with small signal analysis.

Reference Books:

1. Power Electronics - IssaBataresh, Jhonwilley publications, 2004

2. Power switching converters-simonang, alejandro olive, CRC Press (Taylor

&franicsgroup).

3. Elements of Power Electronics – Philip T. Krein, Oxford University press.

4. Power Electronics: converters Applications & Design – Mohan, Undeland, Robbins-

Wileypublications.