ANALYSIS OF POWER ELECTRONIC CONVERTERS-I

Course Code: 13EE2201 **L P C**
4 0 3

Pre requisites: Power Electronics

Course Outcomes: At the end of the course, the students will be able to

CO1: Distinguish between different types of power semiconductor devices and their characteristics

CO2: Analyze Phase controlled converters, AC voltage controllers and Cyclo converters.

CO3: Analyze DC – DC switch mode converters.

CO4: Analyze DC-AC switch mode inverters.

CO5: Describe Principles of Operation & Features of Multilevel Inverters.

UNIT-I POWER SEMICONDUCTOR DEVICES

Power Diodes, Power BJTs, Power MOSFETs, Thyristors, Gate Turn Off Thyristors, IGBTs, MOS-Controlled Thyristors, Comparison of Controllable Switches, Drive and Snubber Circuits, Justification for Using Idealized Device Characteristics.

UNIT-II

CONTROLLED RECTIFIERS & VOLTAGE CONTROLLERS AND CYCLOCONVERTERS

Introduction**,** Principle of phase controlled converter operation, single phase full converters, single phase dual converters, Three phase half wave converters, three phase full converters, Three phase dual converters, Power factor improvements, Single phase semiconverters, Three phase semiconverters.

Introduction, Principle of ON-OFF Control, Single phase bidirectional controllers with resistive loads, Single phase controllers with inductive loads, Three Phase full wave controllers, Single phase transformer connection changers, Single phase cycloconverters, Three phase cycloconverters.

UNIT-III

DC-DC SWITCH MODE CONVERTERS

Introduction, Control of dc-dc converters, Step down (Buck) converter-continuous conduction mode-boundary between continuous and

discontinuous conduction-discontinuous conduction mode. Step up (Boost) converter- continuous conduction mode-boundary between continuous and discontinuous conduction-discontinuous conduction mode.

Buck-Boost converter- continuous conduction mode-boundary between continuous and discontinuous conduction-discontinuous conduction mode-output voltage ripple. Buck dc-dc converter.

UNIT-IV

SWITCH MODE INVERTERS

Introduction, Basic concepts of switch mode inverters, pulse width modulated switching scheme, single phase inverters-half bridge inverters-full bridge inverters-PWM with bipolar voltage switching-PWM with unipolar voltage switching, Push-pull inverters. Three phase inverters-PWM in three phase voltage source inverters-square wave operation in three phase inverters, Ripple in the Inverter output, effect of blanking time on voltage in PWM inverters

UNIT-V

MULTI LEVEL INVERTERS

Introduction, Multilevel Concept, Types of Multilevel Inverters- Diode-Clamped Multilevel Inverter, Principle of Operation, Features of Diode-Clamped Inverter, Improved Diode-Clamped Inverter, Feature of Multilevel Converters, Comparisons of Multilevel Converters.

TEXT BOOKS:

1. Ned Mohan, Tore M. Undeland and William P. Robbins, "*Power Electronics*", John Wiley & Sons, 2007.
2. Md. H. Rashid, "*Power Electronics*", Pearson Education, Third Edition, 2008
3. Bimal K. Bose, "*Modern Power Electronics and AC Drives*", Prentice-hall Of India Pvt. Ltd., 2008.

REFERENCE BOOKS:

1. Philip T. Krein, "*Elements of Power Electronics*", Oxford University Press,2009.
2. L. Umanand, "*Power Electronics: Essentials & Applications*", Wiley India,2009.
3. Robert Erickson and Dragon Maksivimovic, "*Fundamentals of Power Electronics*", Springer Publications, 2001.
4. Issa Batarseh,"*Power Electronics*", John Wiley, 2003.