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**ANALYSIS OF POWER ELECTRONIC CONVERTERS-I****Course Code: 13EE2201****L P C****Pre requisites:** Power Electronics**4 0 3****Course Educational Objectives:** To familiarize the student with switch mode dc-dc & dc-ac converters which find wide application in industry.**Course Outcomes:** At the end of the course, the students will have knowledge in

1. Different types of power semiconductor devices and their characteristics
2. Full and half controlled converters both single and three phase.
3. AC voltage controllers and cycloconverter both single and three phase
4. DC – DC switch mode converters.
5. DC-AC switch mode inverters.
6. Principle 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

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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 Dragomir Maksimovic, “*Fundamentals of Power Electronics*”, Springer Publications, 2001.
4. Issa Batarseh,”*Power Electronics*”, John Wiley, 2003.