

**EL241: POWER ELECTRONICS**  
**CREDITS = 3 (L=3, T=0, P=0)**

**Course Objective:**

1. The course aims to make the student understand the concepts of power electronics.
2. The course will enable students to understand the basics of semiconductor power devices and its industrial applications.

**Teaching and Assessment Scheme:**

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	100
3	0	0	3	70	30	0	0	

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	<b><u>Power electronics systems: an overview:</u></b> Introduction, Power semiconductor devices, power electronics converters, Power electronics applications.	02
2	<b><u>Thyristor: principles and characteristics:</u></b> Introduction, principle of operation of SCR, static Anode-cathode Characteristics of SCR, The two transistor model of SCR, Gate Characteristics of SCR, Turn on methods of SCR, Dynamic Turn - on switching characteristics, Turn off mechanism, turn off methods, Important ratings of SCR.	08
3	<b><u>Gate triggering characteristics:</u></b> Introduction, firing of Thyristors, Gate triggering circuits, Uni Junction Transistor, UJT Relaxation Oscillators , UJT as an SCR Trigger, Synchronized UJT triggering.	06

4	<b><u>Series and parallel operation of thyristors:</u></b> Introduction, Series operation of thyristors, parallel operation of thyristors, String efficiency, derating.	03
5	<b><u>Phase controlled rectifiers:</u></b> Introduction, Single phase Half-wave controlled rectifier, Single phase full wave controlled rectifier.	06
6	<b><u>Choppers and inverters:</u></b> Introduction to choppers, Basic chopper classification, basic chopper operation, control strategies, Introduction of Inverter, classification of Inverters. Single phase Half bridge and Single phase full bridge Inverters.	06
7	<b><u>Power semiconductor devices:</u></b> Introduction: DIAC, TRIAC, Power MOSFET, IGBTs, GTO.	06
8	<b><u>Power electronics applications:</u></b> Introduction, Uninterruptible power supply, SMPS, Di-electric Heating, Induction Heating, Battery Charger and Control of DC drives.	06
<b>TOTAL</b>		<b>43</b>

### Reference Books:

1. Power Electronics by M D Singh and K B Khanchandani (TMH)
2. Power Electronics Circuits Devices and Application by Muhammad Rashid (PHI)
3. Power Electronics by Dr. P S Bimbhra (Khanna Publisher)

### Course Outcomes (COs):

At the end of this course students will be able to:

1. Understand the basic concepts of Thyristor.
2. Analyze Phase controlled rectifier, inverter, and chopper circuits
3. Study modern semiconductor power devices.
4. Study power electronics applications in industries