

**GOVT. POLYTECHNIC MAYURBHANJ**

**LESSON PLAN**

<b>Discipline : Electrical Engg.</b>		<b>Semester: 4th</b>		<b>Name of the Teaching Faculty : MANOJ KUMAR PRADHAN</b>	
<b>Subject :</b>		<b>Fundamentals of Power Electronics</b>			
<b>No. of Days / per week class allotted : 03</b>			<b>Semester From date : 22.12.2025</b>		<b>To Date : 18.04.2026</b>
<b>MONTH</b>	<b>Week</b>	<b>Day</b>	<b>UNIT</b>	<b>TOPICS</b>	
<b>DECEMBER</b>	Week 4	2nd	I	Power electronic devices; Power transistor construction and working principle	
	Week 4	5th	I	Power transistor V-I characteristics and uses	
	Week 5	2nd	I	IGBT Construction and working principle	
<b>JANUARY</b>	Week 1	4th	I	IGBT V-I characteristics and uses	
	Week 1	5th	I	Concept of single electron transistor (SET); Aspects of Nano- technology (concept only)	
	Week 1	2nd	I	Review and comparison of power transistors and IGBTs	
	Week 2	4th	I	Applications and selection criteria for power electronic devices	
	Week 2	5th	I	Practical examples and case studies in power electronics	
	Week 2	2nd	I	Emerging trends in power electronic devices	
	Week 3	4th	I	Unit I summary and problem-solving session	
	Week 3	5th	II	Construction of SCR; Two transistor analogy of SCR	
	Week 3	2nd	II	Types, working and characteristics of SCR; SCR mounting and cooling	
	Week 4	4th	II	Types of Thyristors: SCR, LASCR, Types, working and characteristics	
	Week 4	2nd	II	Types of Thyristors: SCS, GTO, UJT Types, working and characteristics	
	Week 5	4th	II	Types of Thyristors: PUT, DIAC and TRIAC, Types, working and characteristics	
	Week 5	5th	II	<b>CLASS TEST - 1</b>	
<b>FEBRUARY</b>	Week 1	2nd	II	Protection circuits: Over-voltage; Over-current	
	Week 1	4th	II	Snubber; Crowbar	
	Week 1	5th	II	Comparison and applications of thyristor family devices	
	Week 2	2nd	II	Unit II summary and examples	
	Week 2	4th	III	SCR Turn-On methods: High Voltage thermal triggering; Illumination triggering	
	Week 2	5th	III	dv/dt triggering; Gate triggering	
	Week 3	2nd	III	Gate trigger circuits: Resistance and Resistance-Capacitance circuits; SCR triggering using UJT	
	Week 3	4th	III	PUT: Relaxation Oscillator and Synchronized UJT circuit; Pulse transformer and opto-coupler based triggering	
	Week 3	5th	III	SCR Turn-Off methods: Class A- Series resonant commutation circuit; Class B-Shunt Resonant commutation circuit	
	Week 4	2nd	III	Class C-Complimentary Symmetry commutation circuit; Class D-Auxiliary commutation	
	Week 4	4th	III	Class E-External pulse commutation; Class F-Line or natural commutation	
	Week 4	5th	III	Review of turn-on and turn-off methods with examples	
<b>MARCH</b>	Week 1	4th	IV	Phase control: firing angle, conduction angle	
	Week 1	5th	IV	Single phase half controlled rectifier with R, RL load: Circuit diagram, working, input-output waveforms	
	Week 2	2nd	IV	Equations for DC output and effect of freewheeling diode for half controlled rectifier	
	Week 2	4th	IV	Single phase full controlled rectifier with R, RL load: Circuit diagram, working, input-output waveforms	
	Week 2	5th	IV	Equations for DC output and effect of freewheeling diode for full controlled rectifier	
	Week 3	2nd	IV	Single phase midpoint controlled rectifier with R, RL load: Circuit diagram, working, input-output waveforms	
	Week 3	4th	IV	Equations for DC output and effect of freewheeling diode for midpoint controlled rectifier	
	Week 3	5th	IV	Different configurations of bridge controlled rectifiers: Full bridge; half bridge with common anode	
	Week 4	2nd	IV	Half bridge with common cathode; SCRs in one arm and diodes in another arm	
	Week 4	4th	IV	Applications and comparison of phase controlled rectifiers	
	Week 5	2nd	V	Applications: Burglar's alarm system; Battery charger using SCR	
<b>APRIL</b>	Week 1	4th	V	Emergency light system; Temperature controller using SCR	
	Week 1	2nd	V	Illumination control/fan speed control TRIAC	
	Week 2	4th	V	SMPS,UPS: Offline and Online	
	Week 2	5th	V	SCR based AC and DC circuit breakers	
	Week 3	4th	V	<b>CLASS TEST - 2</b>	
Week 3	5th	V	Review of industrial control circuits and applications		