



DHENKANAL

LESSONPLAN

Session(2025-2026)

Discipline: Electrical Engineering	Semester: 4 th , Summer/2025-26	Name of the Faculty: SUNANDITA SAHOO
Subject: FUNDAMENTALS OF POWER ELECTRONICS	No. of Days/week: 03	StartDate: 22/12/2025 EndDate: 18/04/26

Week	Class Day	Theory Topics	Date of delivery
1st	1st	Power electronic devices Power electronic devices	
	2nd	Power transistor Construction and working principle	
	3rd	V-I characteristics and uses IGBT Construction and working principle	
2nd	1st	V-I characteristics and uses	
	2nd	Concept of single electron transistor (SET)	
	3 rd	Aspects of Nano-technology (concept only) Assignment-1	
3rd	1st	Thyristor Family Devices SCR Construction of SCR	
	2nd	Two transistor analogy of SCR	
	3dr	Types, working and characteristics SCR mounting and cooling	
4th	1st	Types of Thyristors: SCR, LASCR, SCS, GTO	
	2nd	Types of Thyristors: UJT, PUT, DIAC and TRIAC	
	3rd	Thyristor family devices Symbol and construction Operating principle	
5 th	1st	V-I characteristics Assignment-2	
	2nd	Protection circuits Over-voltage Over-current	
	3rd	Class Test – 1	
6 th	1st	Snubber Crowbar Assignment-3	
	2nd	Turn-on and Turn-off Methods of Thyristors SCR Turn-On methods High voltage thermal triggering	
	3rd	Illumination triggering	
7th	1st	dv/dt triggering Gate triggering	
	2nd	Gate trigger circuits Resistance & Resistance-Capacitance circuits	

	3rd	Quiz Test – I	
8 th	1st	SCR triggering using UJT	
	2nd	PUT: Relaxation oscillator and synchronized UJT circuit	
	3rd	Pulse transformer and opto-coupler based triggering	
9 th	1st	SCR Turn-Off methods Class A – Series resonant commutation Circuit Class B – Shunt resonant commutation Circuit	
	2nd	Class C – Complimentary symmetry commutation Circuit Class D – Auxiliary commutation	
	3rd	Class E – External pulse commutation Class F – Line or natural commutation	
10 th	1st	Class F – Line or natural commutation Class Test – I	
	2nd	Phase Controlled Rectifiers Phase control: firing angle, conduction angle	
	3rd	Single phase half controlled, full controlled and midpoint controlled rectifier with R, RL load	
11 th	1st	Circuit diagram, working, input- output waveforms, equations for DC output and effect of freewheeling diode	
	2nd	Different configurations of bridge controlled rectifiers: Full bridge, half bridge with common anode, common cathode, SCRs in one arm and diodes in another arm	
	3rd	Industrial Control Circuits Applications: Burglar's alarm system Battery charger using SCR Emergency light system	
12 th	1st	Temperature controller using SCR Illumination control/fan speed control TRIAC	
	2nd	SMPS UPS: Offline and Online	
	3rd	SCR based AC and DC circuit breakers	
13 th	1st	Doubt Clearing class	
	2nd	Doubt Clearing class	
	3rd	Doubt Clearing class Assignment-4	
14 th	1st	Doubt Clearing class	
	2nd	Doubt Clearing class	
	3rd	Quiz Test – II	
15 th	1st	Discussion of Previous year questions	
	2nd	Discussion of Previous year questions	
	3rd	Discussion of Previous year questions	

Sunandita *Sahu*
20.12.2025

Name of faculty

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20/01/26

Name of HOD Electrical