Email Id:-gpblselectricalengg@gmail.com

DEPARTMENT OF ELECTRICAL ENGINEERING

Govt. Polytechnic, Balasore

LESSON PLAN FOR ACADEMIC SESSION - 2025-26
FUNDAMENTALS OF POWER ELECTRONICS

Course Code : EEPC202 **(TH:1)**	**Semester : 4th**
Total Periods : 45 Hours	**Examination : 3 Hours**
Theory Periods : 3 P/Week	**Progressive Assessment: 30 Marks**
Maximum Marks : 100	**End Semester Examination : 70 Marks**
Semester From Date : 22/12/2025	**To Date :**
Name of the Teaching Faculty: Er. Biswajit Mallik,Sr. lect.(Elect.)	

WEEK	PERIOD	TOPIC
1st	1st	**Unit-I:** Intro to Power Electronic devices; Power Transistor construction.
	2nd	Power Transistor: Working principle, V-I characteristics and uses.
	3rd	IGBT: Construction and working principle.
2nd	1st	IGBT: V-I characteristics and applications.
	2nd	Concept of Single Electron Transistor (SET).
	3rd	Aspects of Nano-technology (concept only).
3rd	1st	**Unit-II:** SCR: Construction and basic working.
	2nd	Two transistor analogy of SCR.
	3rd	SCR: Types, working, and V-I characteristics.
4th	1st	SCR mounting and cooling techniques.
	2nd	Thyristor Family: Symbols, construction & working of LASCR and SCS.
	3rd	GTO (Gate Turn-Off Thyristor): Operating principle and characteristics.
5th	1st	UJT (Uni-Junction Transistor) and PUT (Programmable UJT).
	2nd	DIAC: Construction, working, and V-I characteristics.
	3rd	TRIAC: Construction, working, and V-I characteristics.
6th	1st	Protection Circuits: Over-voltage and Over-current protection.
	2nd	Snubber circuits (dv/dt protection) and Crowbar protection.
	3rd	**Unit-III:** SCR Turn-On methods: High Voltage & Thermal triggering.

7th	1st	Illumination triggering and dv/dt triggering.
	2nd	Gate triggering methods and requirements.
	3rd	Gate trigger circuits: Resistance (R) triggering.
8th	1st	Gate trigger circuits: Resistance-Capacitance (RC) triggering.
	2nd	SCR triggering using UJT relaxation oscillator.
	3rd	Synchronized UJT circuit and Pulse transformer-based triggering.
9th	1st	Opto-coupler based triggering circuits.
	2nd	SCR Turn-Off (Commutation): Class A (Series resonant).
	3rd	Class B (Shunt Resonant) and Class C (Complementary) commutation.
10th	1st	Class D (Auxiliary) and Class E (External pulse) commutation.
	2nd	Class F (Line or Natural) commutation.
	3rd	**Unit-IV:** Phase control concepts: Firing angle (alpha) and Conduction angle.
11th	1st	1-Phase Half controlled rectifier with R and RL load.
	2nd	1-Phase Full controlled rectifier with R and RL load.
	3rd	1-Phase Midpoint controlled rectifier (Circuit and Waveforms).
12th	1st	Equations for DC output voltage and effect of Freewheeling Diode.
	2nd	Bridge Controlled Rectifiers: Full bridge configuration.
	3rd	Half bridge configurations (Common Anode/Common Cathode).
13th	1st	Bridge configurations: SCRs in one arm and diodes in another.
	2nd	**Unit-V:** Industrial Applications: Burglar's alarm system.
	3rd	Battery charger using SCR and Emergency light system.
14th	1st	Temperature controller using SCR.
	2nd	Illumination control and Fan speed control using TRIAC.
	3rd	SMPS: Working principle and block diagram.
15th	1st	UPS: Offline and Online UPS systems.
	2nd	SCR based AC and DC circuit breakers.
	3rd	Revision of Unit-IV (Waveforms) and Unit-V.

Sr. Lect. B. Mallick 22/12/25
~~Lect. Stage~~ I, Elect Dept.
Government Polytechnic, BLS
Teaching Faculty

B. Mallick 22/12/25
I/C HOD, Dept of EE
Government Polytechnic, BLS

Sr. Lecturer in Electrical Engg.
Govt. Polytechnic,Balasore

Principal
Government Polytechnic,
Balasore

Principal
Government Polytechnic
Balasore