

UTKALMANI GOPABANDHU INSTITUTE OF  
ENGINEERING, ROURKELA



LESSON PLAN

SESSION: 2025-2026

DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

SUBJECT CODE: **TH.5 (b)**

NAME OF THE SUBJECT: **FUNDAMENTAL OF POWER ELECTRONICS**

BRANCH: **ELECTRONICS & TELECOMMUNICATION ENGG.**

SEMESTER: **DIPLOMA 4<sup>TH</sup> SEM**

NUMBER OF CLASSES ALLOTTED PER WEEK: **3**

TOTAL PERIODS ALLOTTED TO THE SUBJECT ACCORDING TO SCTEVT: **45**

NAME OF THE FACULTY: **ASHIS KUMAR MAHARANA**

**UTKALMANI GOPABANDHU INSTITUTE OF ENGINEERING, ROURKELA**



**LESSON PLAN**

**DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING**

<b>SUBJECT CODE:</b>	Th.5(b)
<b>NAME:</b>	<b>FUNDAMENTAL OF POWER ELECTRONICS</b>
<b>BRANCH:</b>	<b>ELECTRONICS &amp; TELECOMMUNICATION</b>
<b>SEMESTER:</b>	<b>DIPLOMA 4<sup>TH</sup> SEM</b>
<b>PERIODS PER WEEK:</b>	<b>3</b>
<b>NAME OF THE FACULTY:</b>	<b>ASHIS KUMAR MAHARANA</b>
<b>NO OF CLASSES ALLOTTED PER WEEK:</b>	<b>3 (22/12/2025 to 18/04/2026)</b>

<b>Week</b>	<b><u>Lecture</u></b>	<b><u>Topic to be covered</u></b>
1 <sup>st</sup> week	1 <sup>st</sup>	Power electronic devices
	2 <sup>nd</sup>	Power transistor construction and working principle
	3 <sup>rd</sup>	Power transistor V-I characteristics and uses
2 <sup>nd</sup> week	1 <sup>st</sup>	IGBT construction and working principle
	2 <sup>nd</sup>	Concept of single electron transistor (SET)
	3 <sup>rd</sup>	Aspects of Nano- technology
3 <sup>rd</sup> week	1 <sup>st</sup>	SCR, Construction of SCR
	2 <sup>nd</sup>	SCR -Types, working and characteristics
	3 <sup>rd</sup>	SCR mounting and cooling

<b>Week</b>	<b><u>Lecture</u></b>	<b><u>Topic to be covered</u></b>
4 <sup>th</sup> week	1 <sup>st</sup>	Types of Thyristors: SCR, LASCR, SCS, GTO, UJT, PUT, DIAC and TRIAC
	2 <sup>nd</sup>	Thyristor family devices
	3 <sup>rd</sup>	Protection circuits - Over-voltage
5 <sup>th</sup> week	1 <sup>st</sup>	Protection circuits - Over-current
	2 <sup>nd</sup>	Protection circuits - Snubber, Crowbar
	3 <sup>rd</sup>	Two transistor analogy of SCR
6 <sup>th</sup> week	1 <sup>st</sup>	SCR Turn-On methods - High Voltage thermal triggering, Illumination triggering
	2 <sup>nd</sup>	SCR Turn-On methods - dv/dt triggering, Gate triggering
	3 <sup>rd</sup>	Gate trigger circuits
7 <sup>th</sup> week	1 <sup>st</sup>	Resistance and Resistance - Capacitance circuits
	2 <sup>nd</sup>	SCR triggering using UJT
	3 <sup>rd</sup>	PUT: Relaxation Oscillator and Synchronized UJT circuit
8 <sup>th</sup> week	1 <sup>st</sup>	Pulse transformer and opto-coupler based triggering
	2 <sup>nd</sup>	SCR Turn-Off methods: Class A- Series resonant commutation circuit, Class B- Shunt Resonant commutation circuit
	3 <sup>rd</sup>	SCR Turn-Off methods: Class C- Complimentary Symmetry commutation circuit, Class D- Auxiliary commutation
9 <sup>th</sup> week	1 <sup>st</sup>	SCR Turn-Off methods: Class E- External pulse commutation, Class F- Line or natural commutation
	2 <sup>nd</sup>	Phase control: firing angle, conduction angle
	3 <sup>rd</sup>	Single phase half controlled rectifier midpoint-controlled with R, RL load
10 <sup>th</sup> week	1 <sup>st</sup>	Single phase full controlled rectifier
	2 <sup>nd</sup>	Midpoint-controlled rectifier with R load
	3 <sup>rd</sup>	Midpoint-controlled rectifier with RL load
11 <sup>th</sup> week	1 <sup>st</sup>	Circuit diagram, working principle of freewheeling diode
	2 <sup>nd</sup>	Input- output waveforms, equations for DC output and effect of freewheeling diode
	3 <sup>rd</sup>	Different configurations of bridge controlled rectifiers: Full bridge

12 <sup>th</sup> week	1 <sup>st</sup>	Different configurations of bridge controlled rectifiers: half bridge with common anode
	2 <sup>nd</sup>	Different configurations of bridge controlled rectifiers: common cathode
	3 <sup>rd</sup>	Different configurations of bridge controlled rectifiers: SCRs in one arm and diodes in another arm
13 <sup>th</sup> week	1 <sup>st</sup>	Burglar's alarm system
	2 <sup>nd</sup>	Battery charger using SCR
	3 <sup>rd</sup>	Emergency light system
14 <sup>th</sup> week	1 <sup>st</sup>	Temperature controller using SCR
	2 <sup>nd</sup>	Illumination control/fan speed control TRIAC
	3 <sup>rd</sup>	SMPS
15 <sup>th</sup> week	1 <sup>st</sup>	UPS, Types of UPS
	2 <sup>nd</sup>	Online UPS system
	3 <sup>rd</sup>	Offline UPS system
16 <sup>th</sup> week	1 <sup>st</sup>	SCR based AC circuit breakers
	2 <sup>nd</sup>	SCR based DC circuit breakers
	3 <sup>rd</sup>	Review of Chapter 1
17 <sup>th</sup> week	1 <sup>st</sup>	Review of Chapter 1 & 2
	2 <sup>nd</sup>	Review of Chapter 3 & 4
	3 <sup>rd</sup>	Review of Chapter 5