



NILASAILA INSTITUTE OF SCIENCE & TECHNOLOGY  
SERGARH-756060, BALASORE (ODISHA)  
(Approved by AICTE& affiliated to SCTE&VT, Odisha)



## LESSON PLAN

**SUBJECT: Th-5 (POWER ELECTRONICS AND PLC)**

### CHAPTER WISE DISTRIBUTION OF PERIODS

Sl.No.	Name of the chapter as per the Syllabus	No. of Periods as per the Syllabus	No. of periods actually needed
1	Understand The Construction And Working Of Power Electronic Devices	18	18
2	Understand The Working Of Converters, Ac Regulators And Choppers.	12	12
3	Understand The Inverters And Cyclo-Converters	8	8
4	Understand Applications Of Power Electronic Circuits	10	10
5	PLC And Its Applications	12	12
	Total Period:	60	60

Discipline: ELECTRICAL ENGG.	Semester: 5 <sup>th</sup>	Name of the Teaching Faculty: Er. BIJAYA KUMAR BEHERA
Week	Class Day	Theory / Practical Topics
<b>1<sup>st</sup></b>	1 <sup>st</sup>	1.1 Construction, Operation, V-I characteristics & application of power diode, SCR,DIAC,TRIAC, Power MOSFET,GTO &IGBT
	2 <sup>nd</sup>	1.2 Two transistor analogy of SCR.
	3 <sup>rd</sup>	1.3 Gate characteristics of SCR.
	4 <sup>th</sup>	1.4 Switching characteristic of SCR during turn on and turn off.
<b>2<sup>nd</sup></b>	1 <sup>st</sup>	1.5 Turn on methods of SCR.
	2 <sup>nd</sup>	1.6 Turn off methods of SCR (Line commutation and Forced commutation) 1.6.1 Load Commutation
	3 <sup>rd</sup>	1.6.2 Resonant pulse commutation
	4 <sup>th</sup>	1.7 Voltage and Current ratings of SCR.
<b>3<sup>rd</sup></b>	1 <sup>st</sup>	1.8 Protection of SCR 1.8.1 Over voltage protection
	2 <sup>nd</sup>	1.8.2 Over current protection
	3 <sup>rd</sup>	1.8.3 Gate protection
	4 <sup>th</sup>	1.9 Firing Circuits 1.9.1 General layout diagram of firing circuit

<b>4<sup>th</sup></b>	<b>1<sup>st</sup></b>	1.9.2 R firing circuits
	<b>2<sup>nd</sup></b>	1.9.3 R-C firing circuit
	<b>3<sup>rd</sup></b>	1.9.4 UJT pulse trigger circuit
	<b>4<sup>th</sup></b>	1.9.5 Synchronous triggering (Ramp Triggering )
<b>5<sup>th</sup></b>	<b>1<sup>st</sup></b>	1.10 Design of Snubber Circuits
	<b>2<sup>nd</sup></b>	2.1 Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual
	<b>3<sup>rd</sup></b>	2.2 working of single-phase half wave controlled converter with Resistive and R-L loads.
	<b>4<sup>th</sup></b>	2.3 Understand need of freewheeling diode.
<b>6<sup>th</sup></b>	<b>1<sup>st</sup></b>	2.4 Working of single phase fully controlled converter with resistive and R- L loads.
	<b>2<sup>nd</sup></b>	2.5 Working of three-phase half wave controlled converter with Resistive load
	<b>3<sup>rd</sup></b>	2.6 Working of three phase fully controlled converter with resistive load.
	<b>4<sup>th</sup></b>	2.7 Working of single phase AC regulator.
<b>7<sup>th</sup></b>	<b>1<sup>st</sup></b>	2.8 Working principle of step up & step down chopper.
	<b>2<sup>nd</sup></b>	2.9 Control modes of chopper
	<b>3<sup>rd</sup></b>	2.10 Operation of chopper in all four quadrants.
	<b>4<sup>th</sup></b>	3.1 Classify inverters.

<b>8<sup>th</sup></b>	<b>1<sup>st</sup></b>	3.2 Explain the working of series inverter.
	<b>2<sup>nd</sup></b>	3.3 Explain the working of parallel inverter
	<b>3<sup>rd</sup></b>	3.4 Explain the working of single-phase bridge inverter.
	<b>4<sup>th</sup></b>	3.5 Explain the basic principle of Cyclo-converter.
<b>9<sup>th</sup></b>	<b>1<sup>st</sup></b>	3.6 Explain the working of single-phase step up & step down Cyclo-converter.
	<b>2<sup>nd</sup></b>	3.7 Applications of Cyclo-converter.
	<b>3<sup>rd</sup></b>	4.1 List applications of power electronic circuits.
	<b>4<sup>th</sup></b>	4.2 List the factors affecting the speed of DC Motors.
<b>10<sup>th</sup></b>	<b>1<sup>st</sup></b>	4.3 Speed control for DC Shunt motor using converter.
	<b>2<sup>nd</sup></b>	4.4 Speed control for DC Shunt motor using chopper.
	<b>3<sup>rd</sup></b>	4.5 List the factors affecting speed of the AC Motors.
	<b>4<sup>th</sup></b>	4.6 Speed control of Induction Motor by using AC voltage regulator.
<b>11<sup>th</sup></b>	<b>1<sup>st</sup></b>	4.7 Speed control of induction motor by using converters and inverters (V/F control).
	<b>2<sup>nd</sup></b>	4.8 Working of UPS with block diagram.
	<b>3<sup>rd</sup></b>	4.9 Battery charger circuit using SCR with
	<b>4<sup>th</sup></b>	4.10 Basic Switched mode power supply (SMPS) - explain its working & applications

<b>12<sup>th</sup></b>	<b>1<sup>st</sup></b>	5.1 Introduction of Programmable Logic Controller(PLC)
	<b>2<sup>nd</sup></b>	5.2 Advantages of PLC
	<b>3<sup>rd</sup></b>	5.3 Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.
	<b>4<sup>th</sup></b>	5.4 Applications of PLC
<b>13<sup>th</sup></b>	<b>1<sup>st</sup></b>	5.5 Ladder diagram
	<b>2<sup>nd</sup></b>	5.6 Description of contacts and coils in the following states i)Normally open ii) Normally closed iii) Energized output iv)latched Output v)
	<b>3<sup>rd</sup></b>	5.7 Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate.
	<b>4<sup>th</sup></b>	5.8 Ladder diagrams for combination circuits using NAND,NOR, AND, OR and NOT
<b>14<sup>th</sup></b>	<b>1<sup>st</sup></b>	5.9 Timers-i)T ON ii) T OFF and iii)Retentive timer
	<b>2<sup>nd</sup></b>	5.10 Counters-CTU, CTD
	<b>3<sup>rd</sup></b>	5.11 Ladder diagrams using Timers and counters
	<b>4<sup>th</sup></b>	5.12 PLC Instruction set
<b>15<sup>th</sup></b>	<b>1<sup>st</sup></b>	5.13 Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light
	<b>2<sup>nd</sup></b>	5.14 Special control systems- Basics DCS & SCADA systems
	<b>3<sup>rd</sup></b>	5.15 Computer Control–Data Acquisition, Direct Digital Control System (Basics only)
	<b>4<sup>th</sup></b>	CLASS TEST

