



GOVERNMENT POLYTECHNIC, PURI DEPARTMENT OF ELECTRICAL ENGINEERING

Discipline:
**ELECTRICAL
ENGINEERING**

Semester:
5TH

Name of the Teaching Faculty: ABHISEK DASH
PTGF IN ELECTRICAL ENGINEERING

Subject: 5
POWER
ELECTRONICS
AND PLC

No. of
classes
allotted per
week:04

Semester From date: 01.08.2023 To Date: 30.11.2023

No. of Weeks:15

**PRE-
REQUISITE**

Basic knowledge about the construction, working principle & application of various power electronics devices and also PLC programming.

**COURSE
OUTCOMES**

CO1: Understand construction, working principle & application of various power electronics devices.
CO2: Understand The Working Of Converters, Ac Regulators And Choppers.
CO3: Understand The Inverters And Cyclo-Converters
CO4: Understand Applications Of Power Electronic Circuits
CO5: PLC And Its Applications

Week	Class Day	Theory/Practical Topics	DELIVERY METHOD
1 ST	1 ST	Construction, Operation, V-I characteristics & application of power diode, SCR, DIAC, TRIAC, Power MOSFET, GTO & IGBT	Whiteboard
	2 ND	Two transistor analogy of SCR.	Whiteboard
	3 RD	Gate characteristics of SCR	Whiteboard
	4 TH	Switching characteristic of SCR during turn on and turn off.	Whiteboard
2 ND	1 ST	Turn off methods of SCR	Whiteboard
	2 ND	Voltage and Current ratings of SCR.	Whiteboard
	3 RD	Protection of SCR	Whiteboard
	4 TH	QUIZ&ASSIGNMENT-I	Lecture notes
3 RD	1 ST	Firing Circuits	Whiteboard
	2 ND	Design of Snubber Circuits	Whiteboard
	3 RD	Controlled rectifiers Techniques(Phase Angle, Extinction Angle control), Single quadrant semi converter, two quadrant full converter and dual Converter	Whiteboard
	4 TH	Working of single-phase half wave controlled converter with Resistive and R-L loads.	Whiteboard
4 TH	1 ST	Understand need of freewheeling diode.	Whiteboard
	2 ND	Working of single phase fully controlled converter with resistive and R- L loads.	Whiteboard
	3 RD	QUIZ&ASSIGNMENT-II	Lecture notes
	4 TH	Working of three-phase half wave controlled converter with Resistive load	Whiteboard
5 TH	1 ST	Working of three phase fully controlled converter with resistive load.	Whiteboard
	2 ND	Working of single phase AC regulator.	Whiteboard
	3 RD	QUIZ&ASSIGNMENT-III	Lecture notes
	4 TH	Working principle of step up & step down chopper	Whiteboard
6 TH	1 ST	Control modes of chopper	Whiteboard
	2 ND	Operation of chopper in all four quadrants.	Whiteboard
	3 RD	QUIZ&ASSIGNMENT-IV	Lecture notes

	4 TH	Classify inverters.	Whiteboard
7 TH	1 ST	Classify inverters.	Whiteboard
	2 ND	Explain the working of parallel inverter	Whiteboard
	3 RD	Explain the working of single-phase bridge inverter	Whiteboard
	4 TH	Explain the basic principle of Cyclo-converter	Whiteboard
8 TH	1 ST	QUIZ&ASSIGNMENT-V	Lecture notes
	2 ND	Explain the working of single-phase step up & step down Cyclo-converter.	Whiteboard
	3 RD	Applications of Cyclo-converter.	Whiteboard
	4 TH	List applications of power electronic circuits.	Whiteboard
9 TH	1 ST	List the factors affecting the speed of DC Motors.	Whiteboard
	2 ND	Speed control for DC Shunt motor using converter	Whiteboard
	3 RD	Speed control for DC Shunt motor using chopper	Whiteboard
	4 TH	List the factors affecting speed of the AC Motors.	Whiteboard
10 TH	1 ST	Speed control of Induction Motor by using AC voltage regulator.	Whiteboard
	2 ND	Speed control of induction motor by using converters and inverters (V/F control)	Whiteboard
	3 RD	Working of UPS with block diagram.	Whiteboard
	4 TH	Battery charger circuit using SCR with the help of a diagram.	Whiteboard
11 TH	1 ST	QUIZ&ASSIGNMENT-VI	Lecture notes
	2 ND	Basic Switched mode power supply (SMPS) - explain its working & applications	Whiteboard
	3 RD	Introduction of Programmable Logic Controller(PLC)	Whiteboard
	4 TH	Advantages of PLC	Whiteboard
12 TH	1 ST	Different parts of PLC by drawing the Block diagram and purpose of each part of PLC.	Whiteboard
	2 ND	QUIZ&ASSIGNMENT-VII	Lecture notes
	3 RD	Applications of PLC	Whiteboard
	4 TH	Ladder diagram	Whiteboard
13 TH	1 ST	Description of contacts and coils in the following states i) Normally open ii) Normally closed iii) Energized output iv) latched Output v) branching	Whiteboard
	2 ND	QUIZ&ASSIGNMENT-VIII	Lecture notes
	3 RD	Ladder diagrams for i) AND gate ii) OR gate and iii) NOT gate	Whiteboard
	4 TH	Ladder diagrams for combination circuits using NAND, NOR, AND, OR and NOT	Whiteboard
14 TH	1 ST	Timers-i) T ON ii) T OFF and iii) Retentive timer	
	2 ND	QUIZ&ASSIGNMENT-IX	Lecture notes
	3 RD	Counters-CTU, CTD	
	4 TH	Ladder diagrams using Timers and counters	
15 TH	1 ST	PLC Instruction set	
	2 ND	Ladder diagrams for following (i) DOL starter and STAR-DELTA starter (ii) Stair case lighting (iii) Traffic light Control (iv) Temperature Controller	
	3 RD	Special control systems- Basics DCS & SCADA systems	
	4 TH	Computer Control-Data Acquisition, Direct Digital Control System (Basics only)	
16 th	1 ST	Revision	
	2 ND	Revision	
	3 RD	Revision	
	4 TH	Revision	

LEARNING RESOURCES:

1. Power Electronics Dr. P. S. Bhimbhra Khanna Publisher
2. Modern Power Electronics B.K. Bose PHI Publisher

WEBSITE RESOURCES:

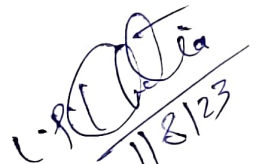
<https://youtu.be/ZbvWe9xBu3Q>

<https://youtu.be/ozUsp9HoPM>


1-8-23

Sign. of Faculty concerned


Principal
G.P. Puri
1/8/23


11/8/23
Sign. of HOD i/c