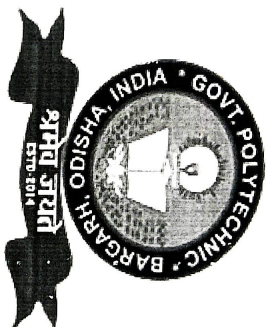


DEPARTMENT OF ELECTRICAL ENGINEERING
GOVERNMENT POLYTECHNIC, BARGARH



LESSON PLAN

POWER ELECTRONICS & PLC (TH 5)

5th SEMESTER

ELECTRICAL ENGINEERING

PREPARED BY

NITESH KUMAR ACHARYA

LECTURER STAGE II (ELECTRICAL)

DEPARTMENT OF ELECTRICAL ENGINEERING

VISION:

To produce Electrical Engineer professionals who can contribute for socio-economic and technological development to meet global needs.

MISSION:

M1 - To strengthen academic infrastructure leading to quality professional by using modern technical tools and technologies.

M2 - To impart innovative knowledge among the students and make more industry-institution programs to make them successful professionals for serving the society.

M3 - To provide a learning environment to improve problem solving abilities, leadership abilities, ethical responsibilities and lifelong learning.

PROGRAM EDUCATIONAL OBJECTIVES (PEOS)

PEO1: Apply electrical engineering knowledge and practical skills to solve well-defined engineering problems using modern tools and techniques.

PEO2: Perform effectively in industry and society as competent junior engineer, supervisors, or entrepreneurs with ethical and sustainable engineering practices.

PEO3: Demonstrate teamwork, communication, leadership, and project management skills in professional engineering activities.

PEO4: Engage in lifelong learning and adapt to emerging technologies for career growth and higher education.

PROGRAM SPECIFIC OUTCOMES

The electrical diploma engineers will be able to:

PSO1:-Apply the fundamentals of mathematics, science and engineering knowledge to identify, formulate, design and investigate engineering problems of electric circuits, analog and digital electronics, control system, electrical machines and power system.

PSO2:- Apply the appropriate techniques and modern engineering hardware and software tools in electrical engineering to engage in life-long learning and to successfully adapt in multidisciplinary environments.

PSO3:-Work professionally in power systems engineering, Electrical machinery and electrical circuit.

GOVERNMENT POLYTECHNIC, BARGARH

DEPARTMENT OF ELECTRICAL ENGINEERING

Semester: 5th
Subject: PEG&PLC
Branch: Electrical Engineering

Season: Winter -2025
No. of period: 60 (4p/week)
Name of Faculty: Nilesh Ku. Acharya

Class No.	Topics to be Covered
1	Introduction to Power Electronics, Construction & V-I Characteristics of Power Diode
2	Operation and Applications of Power Diode
3	Construction, Operation & V-I Characteristics of SCR
4	Construction, Operation & V-I Characteristics of DIAC & TRIAC
5	Construction, Operation & V-I Characteristics of Power MOSFET
6	Construction & Characteristics of GTO and IGBT
7	Two-Transistor Analogy of SCR
8	Gate Characteristics and Switching of SCR
9	Turn-off Methods: Load Commutation
10	Turn-off Methods: Resonant Pulse Commutation
11	SCR Protection: Over Voltage, Over Current and Gate Protection
12	R Firing Circuit
13	RC Firing Circuit
14	UJT Pulse Triggering Circuit
15	Synchronous Triggering and Design of Snubber Circuit
16	Tutorial/Numerical Problems on SCR and Firing Circuits
17	Single-Phase Half-Wave Controlled Rectifier (R Load)
18	Single-Phase Half-Wave Controlled Rectifier (R-L Load)
19	Free-Wheeling Diode
20	Single-Phase Fully Controlled Converter (R Load)
21	Single-Phase Fully Controlled Converter (R-L Load)
22	Three-Phase Half-Wave Controlled Converter
23	Single-Phase AC Regulator
24	Step-Up Chopper
25	Step-Down Chopper
26	Chopper Control Modes
27	Four-Quadrant Chopper Operation
28	Classification of Inverters
29	Series Inverter
30	Parallel Inverter
31	Single-Phase Bridge Inverter
32	Cycloconverter: Principle and Classification

33	Step-Up Cycloconverter
34	Step-Down Cycloconverter
35	Applications of Cycloconverters
36	Tutorial/Numerical Problems on Converters, Choppers and Inverters
37	Speed Control of DC Shunt Motor using Converter
38	Speed Control of DC Shunt Motor using Chopper
39	Speed Control of Induction Motor using AC Voltage Regulator
40	UPS: Online and Offline UPS
41	Battery Charger using SCR
42	SMPS: Working and Applications
43	Introduction to PLC
44	Advantages, Architecture and Block Diagram of PLC
45	PLC Applications and Ladder Diagram Basics
46	PLC Contacts and Coils (NO, NC, Output, Latch, Branching)
47	Ladder Diagram for AND, OR and NOT Logic
48	Ladder Diagram for NAND and NOR Logic
49	PLC Timers: ON Delay, OFF Delay and Retentive Timer
50	PLC Counters: CTU and CTD
51	Ladder Diagram for DOL Starter
52	Ladder Diagram for Star-Delta Starter
53	Ladder Diagram for Staircase Lighting
54	Ladder Diagram for Traffic Light Control
55	Introduction to DCS and SCADA Systems
56	PLC Programming Practice and Case Studies
57	Tutorial and Numerical Practice
58	Revision of Unit I & II
59	Revision of Unit III & IV
60	Comprehensive Revision and Question Discussion

Faculty Signature

HOD Signature