

DEPARTMENT OF ELECTRICAL ENGINEERING
GOVERNMENT POLYTECHNIC, BARGARH



LESSON PLAN

FUNDAMENTAL OF POWER ELECTRONICS (TH 1)

4th SEMESTER

ELECTRICAL ENGINEERING

PREPARED BY

HEMANTA KUMAR PRADHAN

LECTURER (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: 4th

Subject: Fundamental of Power Electronics

Branch: Electrical Engineering

Season: Summer -2026

No. of period: 45(3p/week)

Name of Faculty: Hemanta Kumar Pradhan

Class No.	Topics to be Covered
1	Introduction to the Course, Syllabus Discussion, Course Outcomes and Evaluation Scheme
2	Introduction to Power Electronics and Applications
3	Classification of Power Electronic Devices
4	Power Transistor: Construction and Symbol
5	Power Transistor: Working Principle
6	Power Transistor: V-I Characteristics and Applications
7	IGBT: Construction
8	IGBT: Working Principle
9	IGBT: V-I Characteristics and Applications
10	Concept of Single Electron Transistor (SET)
11	Aspects and Applications of Nano Technology
12	SCR: Construction and Symbol
13	SCR: Working Principle and Operation
14	SCR Static & Dynamic Characteristics
15	Two-Transistor Analogy of SCR
16	SCR Mounting Techniques
17	SCR Cooling Methods
18	SCR Family: LASCR and SCS
19	SCR Family: GTO, UJT and PUT
20	SCR Family: DIAC and TRIAC
21	Protection Circuits: Over-voltage Protection
22	Protection Circuits: Over-current Protection
23	Snubber Circuit and Crowbar Circuit
24	SCR Turn-ON Methods: High Voltage, Thermal and Light Triggering
25	SCR Turn-ON Methods: dv/dt Triggering
26	SCR Gate Triggering Principles
27	Gate Triggering Circuits: Resistance (R) Triggering
28	Gate Triggering Circuits: RC Triggering
29	Gate Triggering Circuits: UJT Triggering
30	Gate Triggering Circuits: Pulse Transformer Triggering
31	SCR Turn-OFF Methods: Class A and Class B Commutation
32	SCR Turn-OFF Methods: Class C and Class D Commutation
33	SCR Turn-OFF Methods: Class E and Class F Commutation

34	Phase Controlled Rectifiers: Firing Angle, Extinction Angle and Conduction Angle
35	Single-Phase Half-Controlled Rectifier with R and RL Loads
36	Single-Phase Full-Controlled and Midpoint Controlled Rectifiers
37	Single-Phase Full Bridge Controlled Rectifier
38	Half Bridge Controlled Rectifier: Common Anode and Common Cathode Configurations
39	Industrial Applications: Burglar Alarm System Using SCR
40	Industrial Applications: Battery Charger Using SCR
41	Industrial Applications: Emergency Light System
42	Study of SMPS and Its Applications
43	Study of Offline and Online UPS; SCR-Based AC and DC Circuit Breakers
44	Numerical Problems, Tutorial and Comprehensive Revision
45	Model Question Discussion, Doubt Clearing and End Semester Examination Preparation

Faculty Signature

HOD Signature