

LESSON PLAN

Utilization of Electrical Energy and Traction

5th Semester Diploma in Electrical Engineering (SCTEVT Odisha)



Name of the Faculty-

SIBANANDAPATHY

Total Periods Assigned: 60 Periods (Theory)

10th Sep 2025 – 23rd Dec 2025

(15 weeks)

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.

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Entrepreneurship and Management & Smart Technology (TH-1)

Unit-wise Distribution (60 Periods)

Unit	Topic	Periods
Unit-1	Electric Heating & Welding	15
Unit-2	Illumination	13
Unit-3	Electric Drives	8
Unit-4	Electric Traction Fundamentals	18
Unit-5	Modern Traction & Energy Conservation	6
Total		60

Period Distribution (60 Periods)

Total Periods: 60 (4 Periods/Week)

Class No.	Topics to be Covered
1	Introduction to Utilization of Electrical Energy
2	Advantages of Electrical Energy Utilization
3	Classification of Electrical Heating
4	Resistance Heating – Principle
5	Resistance Heating Applications
6	Induction Heating – Principle
7	Core Type Induction Furnace
8	Coreless Induction Furnace
9	Dielectric Heating
10	Applications of Dielectric Heating
11	Arc Heating
12	Electric Arc Furnace
13	Resistance Welding
14	Arc Welding
15	Welding Equipment and Applications
16	Introduction to Illumination
17	Terms Used in Illumination
18	Laws of Illumination
19	Polar Curves and Lighting Calculations
20	Lighting Schemes

Class No.	Topics to be Covered
21	Incandescent Lamps
22	Fluorescent Lamps
23	Mercury Vapour Lamps
24	Sodium Vapour Lamps
25	LED Lamps
26	Comparison of Different Lamps
27	Illumination Design Problems
28	Illumination Design Problems
29	Electric Drives – Introduction
30	Factors Governing Selection of Drives
31	Classification of Electric Drives
32	Individual, Group and Multi-Motor Drives
33	Characteristics of Electrical Drives
34	DC Motor Drives
35	AC Motor Drives
36	Industrial Applications of Drives
37	Introduction to Electric Traction
38	Systems of Electric Traction
39	Comparison of Traction Systems
40	Track Electrification Systems
41	Tractive Effort
42	Adhesion and Coefficient of Adhesion
43	Speed-Time Curve
44	Speed-Time Curve Calculations
45	Simplified Speed-Time Curve
46	Traction Motor Characteristics
47	Series Motor for Traction
48	Braking in Electric Traction
49	Rheostatic Braking
50	Regenerative Braking
51	Plugging
52	Energy Consumption in Traction
53	Specific Energy Consumption
54	Mechanics of Train Movement
55	Traction System Calculations

Class No.	Topics to be Covered
56	Modern Electric Locomotives
57	Electric Multiple Units (EMU)
58	Metro Rail and High-Speed Rail Systems
59	Energy Conservation in Traction
60	Revision and Numerical Practice

Faculty Signature: _____

HOD Signature: _____