

Course Type	Course Code	Name of Course	L	T	P	Credit
ESO	EEE202	Utilization of Electrical Energy	3	0	0	9

Course Objective
The course will impart technological understanding of electrical energy utilization in light of basic scientific knowledge. The course covers application aspects of different electrical motors and their fundamental control strategies.
Learning Outcomes
Upon successful completion of this course, students will be able to understand operating principle of different power converters and their control, elementary heating and welding processes and Illumination techniques.

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Traction System: Electrical motors used in traction system, Characteristics of the motors, Track electrification strategies, tractive effort, factors affecting energy consumption, Traction motor controls, protective devices.	12	Understanding of Electric Traction system, electrical and mechanical requirements for traction system.
2	Motor Control: Full-wave rectifier drive for DC motor, Half-wave rectifier drive for DC motor, Induction open-loop and closed-loop control.	9	Understanding of the fundamentals of electrical motor control in different applications.
3	Electric Heating and Welding: Resistance heating, Induction heating and Dielectric heating and their industrial applications. Resistance, arc and ultrasonic welding, characteristics of welding transformers modern welding techniques and control.	11	Understanding of the need and different techniques of electric heating, the operations of different furnaces for industrial process. Also Understand the different electric welding techniques, applications of heating and welding.
4	Illumination: Laws of illumination, polar curves, photometry, types of lamps, modern energy efficient lamps, Driver circuit for the lamps, Light control.	10	Understanding of different laws related to illumination and apply them to analyze the requirements and subsequently design the desired lighting scheme. Understand the operations of energy efficient lamps and their arrangements.

Text Books

1. Utilization of Electric Power and Electric Traction by J.B. Gupta
2. Utilization of Electrical Energy by Openshaw Taylor.
3. Generation Distribution and Utilization of Electrical Power by C.L. Wadhwa

Reference Books

1. Advanced Electric Drive vehicles by Ali Emadi; Florence Berthold, CRC press