| Course Type | Course Code | Name of Course | L | T | P | Credit |
|---|---|---|---|---|---|---|
| OE | EEO302 | Industrial Utilization of Electrical Power | 3 | 0 | 0 | 9 |

**Course Objective**

The course will impart knowledge on different factors of utilization of electrical power from industrial point of view. This includes electricity pricing, motor control strategies, electric traction systems, EV/EHV and illumination.

**Learning Outcomes**

Upon successful completion of this course, students will:

- be able to understand the operations of different electricity pricing systems.
- be able to understand different motor control strategies and electric traction systems.
- be able to understand basics of electric vehicle.
- be able to understand illuminations systems.

| Unit No. | Topics to be Covered | Lecture Hours | Learning Outcome |
|---|---|---|---|
| 1 | **Tariffs:** Factors affecting the electricity pricing/forecasting methodology; Types of tariffs: flat demand rate, straight line meter rate, block meter rate, Two-part, power-factor, sessional rate, peak load, three-part; price comparison by power sources; Availability Based Tariff (ABT). | 6 | Understanding of different factors related to electrical pricing in electrical power system. |
| 2 | **Motor Control:** Vector control of induction motor, Synchronous motor control, Converter controlled DC motors, Four quadrant operation of electrical motors. | 8 | Understanding the speed control of AC and DC motors. |
| 3 | **Electric Traction:** System of track electrification, supply system, power factor & harmonics, tractive effort, factors affecting energy consumption, Electric and diesel-electric traction systems, modern traction motors and control. | 9 | Understanding of Electric Traction system, electrical and mechanical requirements for traction system, types of different traction system and their control. |
| 4 | **Electric and Hybrid Vehicle:** Vehicle dynamics, vehicle power, components of the electric and hybrid vehicle, types, series and parallel configuration, battery powered vehicles. | 9 | Understanding of Electric and Hybrid Electric Vehicles, their components and classifications. Also understand the operations and requirements of a battery power electric vehicle. |
| 5 | **Illumination:** Illumination from point, line and surface sources, Laws of illumination, polar curves, photometry and spectrometry; photocells, types of lamps, modern energy efficient lamps, driver circuit for the lamps, general illumination design. | 10 | Explain the 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 Electrical Energy by Openshaw Taylor.
2. 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