# UTILIZATION OF ELECTRIC POWER

**VI Semester: EEE**

| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIA | SEE | Total |
| AEEB51 | Professional Elective | 3 | - | - | 3 | 30 | 70 | 100 |
| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | | | | Total Classes: 45 | | |

## OBJECTIVES:

**The students will try to learn:**

I The performance characteristics of electrical drives and their deployment with different loading environment.

II The importance of Electrical power in various utilities with illumination, heating and welding.

III The impact of acceleration, braking, retardation and adhesive weight in electric traction system.

## COURSE OUTCOMES:

**After successful completion of the course, students will be able to:**

CO 1 **Demonstrate** the characteristics of various electric drives for economical operation in various industries.

CO 2 **Choose** appropriate electric drive and electric system for different types of loads.

CO 3 **Summarize** the advantages of electric heating techniques for commercial consumers.

CO 4 **Describe** types of AC and DC Welding methods for domestic applications.

CO 5 **Make use of** the principle of Illumination for designing of Electrical appliances.

CO 6 **Identify** different types of Electrical lamps for various electrical utilities

CO 7 **Demonstrate** the system of electric traction and track electrification for locomotives in traction system.

CO 8 **Determine** the tractive effort, coefficient of adhesion and braking retardation for reliable traction run.

CO 9 **Interpret** speed-time curves for various services **for economical Operation of electric traction.**

CO 10 **Inspect** mathematical and graphical analysis considering various practical issues to ensure effective traction system.

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## MODULE-I ELECTRIC DRIVES

Type of electric drives, choice of motor, starting and running characteristics, speed control, temperature rise, particular applications of electric drives, types of industrial loads, continuous, intermittent and variable loads, load equalization

| MODULE-II | ELECTRIC HEATING AND WELDING |
|---|---|
| Electric heating: Advantages and methods of electric heating, resistance heating induction heating and dielectric heating: Electric welding: resistance and arc welding, electric welding equipment, comparison between AC and Welding | |
| **MODULE-III** | **ILLUMINATION** |
| Illumination: Introduction, terms used in illumination, laws of illumination, polar curves, photometry, integrating sphere.<br><br>Sources of light: Discharge lamps, MV and SV lamps, comparison between tungsten filament lamps and fluorescent tubes, basic principles of light control, types and design of lighting and flood lighting | |
| **MODULE-IV** | **TRAIN MECHANICS** |
| System of electric traction and track electrification, review of existing electric traction systems in India, special features of traction motor, methods of electric braking-plugging, rheostat braking and regenerative braking, mechanics of train movement, speed-time curves for different service: Trapezoidal and quadrilateral speed time curves. | |
| **MODULE-V** | **ELECTRIC TRACTION** |
| Calculations of tractive effort, power, specific energy consumption for given run, effect of varying acceleration and braking retardation, adhesive weight and braking retardation adhesive weight and coefficient of adhesion. | |
| **Text Books:** | |
| 1. S Sivarnagaraju, D Srilatha, M Balasubbareddy, "Generation and Utilization of Electrical Energy", Pearson Education India, 1st Edition, 2010.<br>2. E Openshaw Taylor, Orient Longman, "Utilizations of Electric Energy", 1st Edition, 2003. | |
| **Reference Books:** | |
| 1. N V Suryanarayana, "Utilization of Electrical Power including Electric drives and Electric traction New Age International (P) Limited, Publishers, 1st Edition, 1996.<br>2. C L Wadhwa, "Generation, Distribution and Utilization of electrical Energy", New Age International (P) Limited, 1st Edition, 1997.<br>3. Partab, "Art & Science of Utilization of electrical Energy", Dhanpat Rai &Sons 2nd Edition, 2000. | |
| **Web References:** | |
| 1. https://www.NPTEL video lectures.<br>2. https://www.electrical4u.com. | |
| **E- Text Books:** | |
| 1. https://www.freebookcentre.net<br>2. https://www.books.askvenkat.com/engineering-textbooks | |