IV B.Tech II Semester

15AEE35-UTILIZATION OF ELECTRICAL ENERGY

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Course Objectives:

This course enables the students to

- *Understand different types of heating and welding techniques.*
- *Study the basic principles of illumination and its units of Illumination.*
- *Understand different lighting design schemes for various applications.*
- *Learn basic principles of traction system & speed time curves for different traction system.*
- *Understand the fundamentals of environmental aspects of hybrid electric vehicles.*
- *Study the concepts of economic aspects of utilizing electrical energy.*

UNIT–I ILLUMINATION

Definition – Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination.Street Lighting and Factory Lighting – Numerical Problems.

UNIT–II ELECTRIC HEATING & WELDING

Electrical Heating: Advantages, Methods of Electric Heating – Resistance, Arc, Induction and Dielectric Heating.

Electric Welding: Types – Resistance, Electric Arc, Gas Welding. Ultrasonic, Welding Electrodes of Various Metals, Defects in Welding.

Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

UNIT–III INTRODUCTION TO HYBRID ELECTRIC VEHICLES

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT–IV ELECTRIC TRACTION

Introduction – Systems of Electric Traction. Comparison Between AC And DC Traction – Special Features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenarative Types. Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral, Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

UNIT–V ECONOMIC ASPECTS OF UTILISING ELECTRICAL ENERGY

Power Factor Improvement, Improvement of Load Factor, Off Peak Loads- Use of Exhaust Steam, Waste Heat Stations, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage, Cost of Renewals.

BOS-chairman

Course Outcomes:

The students will have knowledge on the following concepts to:

- *Identify most appropriate heating & welding techniques for suitable applications*
- *Design the levels of illumination based on the applications*
- *Determine speed-time curves, acceleration & retardation of different traction services.*
- *Estimate energy consumption levels at various modes of operation in traction systems Identify the economic aspects of utilizing electrical energy*

TEXT BOOKS:

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Art & Science of Utilization of electrical Energy – by Partab, DhanpatRai& Co.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications
3. Generation, distribution and utilization of electrical energy by C.L Wadhwa
4. Hybrid Electric Vehicles: Principles and Applications with Practical Perspectives by Chris Mi; M. AbulMasrur& David WenzhongGao

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