EEOE2 UTILIZATION OF ELECTRICAL ENERGY

COURSE OBJECTIVES:

1. To analyze the principles of illumination and design various indoor and outdoor lighting schemes.
2. To explain the mechanisms of different electric heating methods and their industrial applications.
3. To demonstrate the design procedures for heating elements in furnaces and ovens.
4. To evaluate various electric welding techniques and their suitability for different materials.
5. To provide a comprehensive understanding of the characteristics, charging, and maintenance of storage batteries.

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. Categorize efficient lighting schemes for various environments using different types of lamps and illumination laws.
2. Analyze the operational principles of resistance, induction, and dielectric heating for industrial processing.
3. Evaluate the requirements and characteristics of different electric welding processes.
4. Determine the capacity and performance parameters of storage batteries for various stationary and mobile applications.
5. Specify appropriate heating elements and furnaces

UNIT I *Text Book - 1* [CO:1] **(10)**

Illumination: Introduction- terms used in illumination-laws of illumination. Gas discharge lamps - Fluorescent lamps - Arc lamps - Filament lamps - Comparison between filament and fluorescent lamps.

Lighting schemes & Introduction to Electric heating: Factory lighting - flood lighting and street lighting -introduction to Compact Fluorescent Lamps. Introduction-Modes of heat transfer - Stefan's law - Classification of electric heating methods. (All topics Theory only)

UNIT II *Text Book - 1* [CO:2, 5] **(10)**

Electric Heating element Design and types of furnaces: Design of heating element - Construction and working of different types of induction furnaces -resistance furnace - arc furnaces. Dielectric heating, Dipole formation, generation of dielectric heat and applications. (All topics Theory only)

UNIT III *Text Book - 1* [CO:3, 5] **(10)**

Welding: Introduction- Types of welding - resistance and arc welding -Characteristics of Carbon and metallic arc welding - comparison, welding equipment. Requirements of good weld, comparisons of A.C and D.C weld (Excluding electronic controls) (All topics Theory only)

UNIT IV *Text Book - 1* [CO:4] **(10)**

Storage batteries: Types of cells, classification-dry cell and wet cells, Lead acid cell, Nickel Iron cell, Nickel cadmium batteries. Applications - Common troubles in Charging and discharging - remedies. (All topics Theory only)

LEARNING RESOURCES:

TEXT BOOK(s):

1. J.B. Gupta - Utilization Electric Power and Electric Traction, Katson books publishers, 16th Edition, 2024

2. Utilization, generation & conservation of electrical energy by Sunil S Rao, Khanna publishers, 8th edition, 2024.

REFERENCE BOOK(s):

1. Partab H - Art and Science of Utilization of Electrical Energy, Dhanpat Rai and Sons, New Delhi, Revised Edition, 2024
2. R.K.Rajput - Utilization of Electric Power, Laxmi publications Private Limited, 3rd edition, 2024.
3. G.C.Garg - Utilization of Electric Power and Traction, Kanna publishers, 10th edition, 2024.

WEB RESOURCES:

1. https://archive.nptel.ac.in/courses/108/105/108105060/
2. http://web.mit.edu/lien hard/www/ahttv201.pdf
3. http://www.comp-as.com/pdf/Article03.pdf