

IV B.Tech – I Semester
(17EE741) UTILIZATION OF ELECTRICAL ENGINEERING
(Open Elective-I)

Int. Marks	Ext. Marks	Total Marks	L	T	P	C
40	60	100	3	1	-	3

Pre-Requisites: None

Course Objectives:

- To understand the operating principles and characteristics of traction motors with respect to speed, temperature, loading conditions.
- To acquaint with the different types of heating and welding techniques.
- To study the basic principles of illumination and its measurement.
- To understand different types of lightning system including design.
- To understand the basic principle of electric traction including speed–time curves of different traction services.
- To understand the method of calculation of various traction system for braking, acceleration and other related parameters, including demand side management of energy.

UNIT–I:

Selection of Motors: Choice of motor, type of electric drives, starting and running characteristics–Speed control– Temperature rise–Applications of electric drives–Types of industrial loads–continuous–Intermittent and variable loads–Load equalization.

UNIT–II:

Electric Heating: Advantages and methods of electric heating–Resistance heating induction heating and dielectric heating – Arc furnaces – Direct and indirect arc furnaces

Electric Welding: Electric welding–Resistance and arc welding–Electric welding equipment–Comparison between AC and DC Welding

UNIT–III:

Illumination fundamentals: Introduction, terms used in illumination–Laws of illumination–Polar curves–Integrating sphere– Lux meter–Discharge lamps, MV and SV lamps – Lumen or flux method of calculation - Sources of light.

UNIT–IV:

Various Illumination Methods: Comparison between tungsten filament lamps and fluorescent tubes–Basic principles of light control– Types and design of lighting and flood lighting–LED lighting, principle of operation, street lighting and domestic lighting – Conservation of energy.

UNIT–V:

Electric Traction–I: System of electric traction and track electrification– Review of existing electric traction systems in India– Special features of traction motor– Mechanics of train movement–Speed– time curves for different services – Trapezoidal and quadrilateral speed time curves-High speed transportation trains.

UNIT–VI:

Electric Traction–II: 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–Principles of energy efficient motors–Modern traction motors.

Course Outcomes:

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

S. No	Course Outcome	BTL
1.	Identify a suitable motor for electric drives and industrial applications	L3
2.	Identify the most appropriate heating or welding techniques for suitable applications.	L3
3.	Understand various level of luminosity produced by different illuminating sources.	L2
4.	Estimate the illumination levels produced by various sources and recommend the most efficient illuminating sources and should be able to design different lighting systems by taking inputs and constraints in view.	L5
5.	To determine the speed/time characteristics of different types of traction motors.	L5
6.	To estimate energy consumption levels at various modes of operation.	L5

Correlation of COs with POs & PSOs:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO 1					-	-	-	-	-	-	-			
CO 2					-	-	-	-	-	-	-			
CO 3					-	-	-	-	-	-	-			
CO 4					-	-	-	-	-	-	-			
CO 5					-	-	-	-	-	-	-			
CO 6					-	-	-	-	-	-	-			

Text Books:

1. Utilization of Electric Energy – by E. Openshaw Taylor, Orient Longman.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Sons.

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. Generation, Distribution and Utilization of electrical Energy – by C.L. Wadhwa, New Age International (P) Limited, Publishers, 1997.