

UTILIZATION OF ELECTRICAL ENERGY

Course Code	20EE4501A	Year	III	Semester	I
Course Category	Professional Elective-I	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	--
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the utilization of electrical systems and their advantages in industrial applications. (L2)
CO2	Apply the knowledge to select suitable motor for electric drives, appropriate heating / welding techniques and Illumination systems in various industrial applications. (L3)
CO3	Apply the knowledge to select suitable track electrification system and traction motors. (L3)
CO4	Analyze the concepts of electric drives, different heating/welding techniques and various Illumination systems for industrial applications. (L4)
CO5	Analyze the performance parameters of speed-time curves for different services and the mathematical concepts to design traction system. (L4)
CO6	Submit a report on electric drives, electric heating & welding, illumination and electric traction system.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3					1							2	2
CO3	3						1						2	2
CO4		3				1							2	2
CO5		3					1						2	2
CO6		3				3			3	3			2	2

SYLLABUS		
Unit No.	Contents	Mapped CO
I	Electric Drives Type of electric drive, choice of motor, starting and running characteristics, speed control, temperature rise of electrical machines, heating-time and cooling-time curves, selecting motor power rating for continuous, intermittent and short timeduty, types of industrial loads, applications of electric drives.	CO1 CO2 CO4 CO6

II	Electric Heating & Electric Welding Advantages and methods of electric heating, methods of heat transfer, Stefan's law, design of heating elements, resistance heating, construction and working principle of induction furnaces, arc furnaces and dielectric heating. Types of welding, resistance and arc welding, comparison between A.C and D.C Welding.	CO1 CO2 CO4 CO6
III	Illumination Introduction, Terms used in illumination, laws of illumination, sources of light, Incandescent lamps, Discharge lamps, MV and SV lamps, fluorescent lamps- CFL-LED lamps, Types of lighting schemes, factory lighting, flood lighting and street lighting.	CO1 CO2 CO4 CO6
IV	Electric Traction-I Systems of electric traction and systems of track electrification, special features of traction motors, methods of electric braking-plugging, rheostat braking and regenerative braking, Speed-time curves for different services- trapezoidal and quadrilateral speed time curves.	CO1 CO3 CO5 CO6
V	Electric Traction-II Mechanics of train movement, Calculations of tractive efforts and power output of traction motor, Specific energy consumption for given run, effect of varying acceleration and braking retardation, dead weight, accelerating weight, adhesive weight and coefficient of adhesion, Current collectors for overhead system.	CO1 CO3 CO5 CO6

Learning Resources	
Text Books:	
1. H. Partab, "Art & Science of Utilization of Electrical Energy", Dhanpat Rai & Sons, 12 th edition, 2012.	
2. E. Openshaw Taylor, "Utilization of Electrical Energy", Orient Longman, 15 th edition, 2012.	
Reference Books:	
1. J.B.Gupta, "Utilization of Electric Power and Electric Traction", S.K. Kataria & Sons, 10 th edition, 2012.	
2. C.L.Wadhwa, "Generation, Distribution and Utilization of Electrical Energy", New Age international (P) Limited Publishers, 2015.	
e- Resources	
https://nptel.ac.in/courses/108105060	