

## UTILIZATION OF ELECTRICAL POWER

<b>CourseCode</b>	20EE2702A	<b>Year</b>	IV	<b>Semester</b>	I
<b>Course Category</b>	OE-IV	<b>Branch</b>	Common to all	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	--
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

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

<b>Contribution of Course Outcomes towards achievement of Program Outcomes &amp; Strength of correlations (3:High, 2: Medium, 1:Low)</b>														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2
CO1														
CO2	3					1								
CO3	3						1							
CO4		3				1								
CO5		3					1							
CO6		3				3			3	3				

<b>SYLLABUS</b>		
Unit No.	Contents	Mapped CO
I	<b>Electric Drives</b> 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.	<b>CO1</b> <b>CO2</b> <b>CO4</b> <b>CO6</b>
II	<b>Electric Heating &amp; Electric Welding</b> Advantages and methods of electric heating, methods of heat transfer, Stefan's law, design of heating elements, resistance heating, construction	<b>CO1</b> <b>CO2</b>

	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.	<b>C04</b> <b>C06</b>
III	<b>Illumination</b> 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.	<b>C01</b> <b>C02</b> <b>C04</b> <b>C06</b>
IV	<b>Electric Traction-I</b> 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.	<b>C01</b> <b>C03</b> <b>C05</b> <b>C06</b>
V	<b>Electric Traction-II</b> 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.	<b>C01</b> <b>C03</b> <b>C05</b> <b>C06</b>

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