

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Electrical Power Utilization & Traction
Course Code:	1ET1090605
Pre-requisite Course:	Elements of Electrical Engineering, D.C machine and Transformer

Course Objectives:

1. In this course operation and maintenance of main electrical utilities for their efficient operations includes.
2. This course will enable the students to develop skills to maintain or troubleshoot various electrical equipment or gadgets or appliances in domestic, commercial and industrial sector.
3. The students will be able to make proper selection of equipment according to requirement to ensure economical and efficient use of electricity.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)								
Lecture	Tutorial	Practical	Credit	Theory				Practical				Total
				University Assessment		Continuous Assessment		University Assessment		Continuous Assessment		
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	-	-	3	28	70	12	30	-	-	-	-	100

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Electric Drives: Advantages of electric drives, Characteristics of different mechanical loads, Types of motors used in electric drive, Electric braking, Plugging, Rheostat braking, Regenerative braking, Methods of power transfer by direct coupling by using devices like belt drive, gears, pulley drives etc. Examples of selection of motors for different types of domestic loads, Selection of drive for various applications, Flywheel calculation.	8	20
2	Electric Traction: Electric traction, Advantages of electric traction, Different systems of electric traction, DC and AC systems, diesel electric system, types of services – urban, sub-urban, and main lines and their speed-time curves, Different accessories for track electrification such as overhead capacitor wire, conductor rail system, current collector-pantograph, Factors affecting scheduled speed, Electrical block diagram of an electric locomotive with description of various equipment and accessories, Types of motors used for electric traction, Starting & braking of traction motors.	8	20

3	Electric Heating: Advantages of electrical heating, Heating methods: Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements. Induction heating; principle of core type and coreless induction furnace, Electric arc heating, direct and indirect arc heating, construction, working and applications of arc furnace, Dielectric heating, applications in various industrial fields.	6	14
4	Electric Welding: Advantages of electric welding, welding methods, Principles of resistance welding, types – spot, projection seam and butt, welding and welding equipment used, Electric arc welding, characteristics of arc, carbon arc, metal arc, hydrogen arc welding and their applications, Power supply required, Advantages of using coated electrodes, comparison between AC and DC arc welding.	6	14
5	Illumination: Nature of light, visibility spectrum curve of relative sensitivity of human eye and wave length of light, Different type of lamps, construction and working of incandescent and discharge lamps – their characteristics, fittings required for filament lamp, mercury vapor lamp, fluorescent lamp, street lighting, flood lighting.	8	20
6	Electrolytic Processes: Need of electro-deposition, Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing, Equipment and accessories for electroplating, Factors affecting electro-deposition, Principle of galvanizing and its applications, Principle of anodizing and its applications, electroplating on non-conducting materials, Manufacture of chemicals by electrolytic process and electrolysis process.	6	20

Reference Books:

1. Art and Science of Utilization of Electrical Energy by H.Partap, Dhanpat Rai & Sons, 2004.
2. Utilization of Electrical Energy by J. B. Gupta, Kataria Publications, 1998.
3. A Text Book of Electrical Power by Dr. S. L. Uppal, Khanna Publications, 1996.
4. Utilization of Electrical Energy by O. S. Taylor, Pitman Publications, 2013.
5. Generation, Distribution and Utilization if Electrical Power by C. L.Wadhwa, Wiley Eastern, 2012.

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the power electronics technology in efficient utilization of electrical power.	2 Understanding
CLO2	Apply power electronics technology in efficient utilization of electrical power.	3 Applying
CLO3	Analyze effective utilization of Power Electronic Technologies in Electrical Traction.	4 Analyze

CLO4	Apply the power electronic technologies in various process control.	3 Applying
CLO5	Evaluating the lighting system using LED Technologies.	5 Evaluate
CLO6	Understand Electrolytic Processes.	2 Understanding

Mapping of CLOs with POs & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes(PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO1	L			M			L		L		M			L		
CLO2			M		L			M		L		L			M	
CLO3		M		L		L					L		M		L	L
CLO4	M				L		L			M				L		
CLO5		L	L		L	M		M		M						L
CLO6			L				H		M			M	M	M		

H: High, M: Medium, L: Low