C. U. SHAH UNIVERSITY
Wadhwan City

FACULTY OF: - Technology & Engineering
DEPARTMENT OF: -Electrical Engineering
BRANCH: Electrical & Electronics Engineering
SEMESTER: - VII
CODE: - 4TE07EUT1
NAME –Electrical Power Utilization & Traction

Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
							Theory				Practical (Marks)			
							Sessional Exam		University Exam		Internal		University	Total
		Th	Tu	Pr	Total		Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE07EUT1	Electrical Power Utilization & Traction	4	0	2	6	5	30	1.5	70	3	--	20	30	**150**

Objectives

- To became familiar with different driving mechanisms of load.
- To aware the student with different lighting, heating and welding techniques prevailing in the modern technology as well as in the industry.
- Study the principles of electrolysis and various circuit arrangement of electricity in air condition and refrigeration appliances.
- To study different methods, accessories and equipments used in traction
- To understand different types of speed time curve and factors affecting schedule speed for various types of traction services

Prerequisites

- Fundamentals of Electrical Power Systems and Machines

Course Outlines

Sr. No.	Course Contents	Hours
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 applications such as general workshop, textile mill, paper mill, steel mill, printing press, crane, lift etc. Application of flywheel. Specifications of commonly used motors e.g. squirrel cage, slip ring induction motors, AC series motors, FKW motor	10

2	**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 vapour lamp, fluorescent lamp, metal halide lamp, neon lamp General ideas bout street lighting, flood lighting, monument lighting and decorative lighting, light characteristics etc., LED Lighting	08
3	**Electric Heating** Advantages of electric heating , Resistance heating – direct and indirect resistance heating, electric ovens, their temperature range, properties of resistance heating elements, domestic water heaters and other heating appliances and thermostat control circuit ,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 ,Infra-red heating and its applications ,Microwave heating, Simple design problems of resistance heating elements.	08
4	**Electric Welding:** Advantages of electric welding, Welding methods, Principles of resistance welding, types – spot, projection seam and butt, welding and welding equipment used Principle of arc production, 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, welding control circuits , welding of aluminium and copper, Introduction to TIG, MIG welding	06
5	**Electrolytic Processes:** Need of electro-deposition, Laws of electrolysis, process of electro-deposition - clearing, operation, deposition of metals, polishing, buffing Equipment and accessories for electroplating, Factors affecting electro-deposition Principle of galvanizing and its applications, Principle of anodising and its applications , Electroplating on non-conducting materials ,Manufacture of chemicals by electrolytic process and electrolysis process	08
6	**Electrical Circuits used in Refrigeration, Air Conditioning and Water Coolers:** Principle of air conditioning, vapor pressure, refrigeration cycle, eco-friendly refrigerants Description of Electrical circuit used in refrigerator, air conditioner and water cooler	04
7	**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 and braking of traction motors , Introduction to EMU and metro railways	12

Learning Outcomes

The students will learn the techniques of governing and operating various types of drives that is specifically useful for the traction system in day to day practice. The illumination techniques will be useful for the selection of lighting system for various applications in household, commercial and industrial practice. The traction techniques shall be very much useful to deal with the various problems and challenges arising into the railway system.

Books Recommended

1. “Generation and Utilization of Electrical Energy” by S. Sivanagaruju, Pearson
2. “Art and Science of Utilization of Electrical Energy” by H.Partap, Dhanpat Rai & Sons
3. “Utilization of Electrical Energy” by J. B. Gupta, Kataria Publications
4. “A Text Book of Electrical Power” by Dr. S. L. Uppal, Khanna Publications
5. “Modern Electric Traction” by H.Partap, Dhanpat Rai & Sons
6. “Utilization of Electrical Energy” by O. S. Taylor, Pitman Publications
7. “Generation, Distribution and Utilization of Electrical Power” by C. L.Wadhwa, Wiley