

# C.U.SHAH UNIVERSITY – WADHWAN CITY



**FACULTY OF:** -Technology and Engineering (Diploma Engineering)

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** -V

**CODE:** 2TE05ETC1

**NAME** – Electrical Traction and Control (ETC)

## Teaching & Evaluation Scheme:-

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evaluation Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total Marks
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr	TW	Pr	TW	
2TE05ETC1	Electrical Traction and Control	04	00	02	06	05	30	1.5	70	03	---	20	30	---	150

## Objectives:-

- To develop the basic knowledge of electrical traction systems.
- Understanding of working principle and application of traction motors.
- To study of Feeding and distribution system for traction system.
- Analyzing control of traction motors and electric drives.

**Prerequisites:** - •Basic Knowledge of Electrical Machine and Electrical Transmission System.

## Course Outlines:-

Sr. No.	Course Contents	No Of Hours
1	<b>Traction Systems And Latest Trends</b> Introduction, Different Systems of Traction, Merits of Electric Traction, Different Electric Traction Systems, System of Track Electrification, Present Scenario of Indian Railways, Latest Trends in Traction - Metro, Monorail, Magnetic Levitation Vehicle, Steam, Diesel, Diesel-Electric, Battery and Electric Traction Systems, General Arrangement of D.C. System, A.C. Single Phase, Three Phase, Composite Systems, Choice of Traction System -Diesel Electric or Electric.□	12
2	<b>Mechanics of Train Movement</b> Introduction, Typical Speed Time Curves, Crest Speed, Average Speed, Schedule Speed, Factors Affecting Schedule Speed, Simplified Speed Time Curves, Mechanics of Train Movement, Tractive Effort for Propulsion of Train, Power Output from the Driving Axles, Energy Output from the Driving Axles, Dead Weight, Accelerating Weight and Adhesive Weight. Calculation of Train Resistance and Derivation of General Equation, General Equation Applied to Level Track, Track with Gradient and Curves, Numerical Problems.	13
3	<b>Traction Motors and Control</b> General Features of Traction Motors, Operating Characteristics of D. C. Traction Motors, A. C. Traction Motors, Linear Induction Motor in Traction, Comparison Between Different Traction Motors, Rating and Ventilation, Controls of D. C. Motors, Control Systems for Motor Coach Trains, Various Methods of Mechanical Breaking Systems, Control Systems for Electric Locomotives, Calculations for	10

	Starting Rheostats and Numerical Problems, Controls of Single Phase A.C. Motors Along with Details of Control Apparatus, Electric Breaking.	
4	<b>Electric Locomotives and Auxiliary Equipment</b> Classification, Power Conversion and Transmission Systems, Control and Auxiliary Equipment, Important Features of Electric Locomotives, D. C. Locomotives, Current Collecting Equipment, Coach Wiring and Lighting Devices, Protective Devices, Power Supply Accessories for Auxiliary Equipment.	09
5	<b>Feeding and Distribution System</b> Distribution Systems Pertaining to Traction (Distributions and Feeders), Traction Sub-Station Requirements and Selection, Method of Feeding the Traction Sub-Station.	08

### List of Experiments:-

- Study of Various Traction Systems.
- Tutorials on Speed Time Curves.
- Study Energy Saving in Series Parallel Control of D. C. Motor.
- Tutorials on Specific Energy Consumption.
- Study of Current Collecting Equipments.
- Study of Power Diagram of A.C. Locomotive and its Equipment.
- Study of Layout of D. C. Locomotive and Diesel Locomotive.
- Study of Specific Features of D. C. Series Motor as Traction Motor.
- Study of Arno Converter.
- Study of Train Lighting System.
- Study of Multiple Unit Control.
- Study of Energy Recovered in Regenerative Breaking.

### Learning Outcomes:-

- Distinguish Different Traction Systems and Latest Trends in Traction Systems.
- Differentiate Services of Traction System Based on Speed Time Curve.
- Controlling of Different Types of Traction Motors.
- Use of Various Traction System Auxiliaries.
- Knowledge of Distribution System of Traction System.

### Books Recommended:-

- Modern Electric Traction by **H. Partab**, Dhanpat Rai and Sons- New Delhi
- Electric Traction by **A.T. Dover**, Allied Publication,
- Electric Power by **S.L. Uppal**, Khanna Publication
- Electric Traction by **Uppadyay**, Dhanpat Rai and Sons- New Delhi