

# GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

Electrical Engineering

Subject Name: **Electrical Power Utilization and Traction (Institute Elective-II)**

Subject Code: **150906**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Internal Assessment (I)
4	0	2	6	70	30	50

Sr. No	Course content
1.	<p><b>Electric Drives:</b></p> <p>Introduction concept of electric drives, Classification of electric drives, Nature of load, Factors effecting selection of drive, Running characteristics of D.C, Series and shunt motor, 3-phase induction motor, 3-phase synchronous motor and A.C series motors, Starting methods of D.C series and shunt motors, Starting methods of 3-phase induction motors, Examples, starting methods of synchronous motors and single-phase induction motor. Speed control of D.C series and shunt motors, Examples. Speed control of 3-phase induction motor. Examples, Methods of electric braking, of D.C motor, examples. Braking of 3-phase induction motor, Mechanical features of electric drive, Load equalization, Flywheel calculations, examples. Temperatures rise of electric drives heating and cooling curves, Standard ratings of motors, Examples Applications of electric drives and selection of drives for particular service, Conservation approach to be considered. Energy efficient drives.</p>
2.	<p><b>Electrical Traction:</b></p> <p>Introductions, Different traction systems, Various systems of electric traction. Locomotives, Tramways, trolleys, Track electrification, Comparison between A.C and D.C systems of railway electrification, Types of speed and speed-time curves, Examples. Mechanics of train movement, Tractive effort, power, Output, examples., Energy output from driving axles, Energy output using simplified speed-time curves, Examples, Factors affecting energy consumption, dead weight, accelerating weight, Adhesion weight, examples., Traction motors and their characteristics, Starting and speed control of D.C series and shunt motors, Examples, Starting and speed control of A.C series and 3-phase induction motors, Braking of traction motors and mechanical considerations, Conservation approach to be considered.</p>

3.	<p><b>Electrical Heating &amp; Welding</b></p> <p>Advantages of electric heating, Modes of transfer of heat, Classification of electric heating methods, Resistances heating methods, Requirements of heating elements, Design of heating elements, Methods of temperature control, Problems, Induction heating: principle, types of induction furnaces, Direct core type, Vertical core type, Indirect core type, Core less type, Advantages and disadvantages, eddy current heating, Applications examples., Arc-furnace: principle, Types, direct and indirect arc furnaces, Power supply and control, Condition for maximum output, Examples., Dielectric heating: principles, advantages and disadvantages, Applications, Choice of frequency, Examples., Electric welding: different types of resistance welding and electric arc welding, Conservation approach to be considered. Energy efficient processes.</p>
4.	<p><b>Electrolytic Process:</b></p> <p>Principle, Faradays laws of electrolysis, Current efficiency, Energy efficiency etc., Rating of metals, Production of chemicals, Electro-deposition, Electroplating, Power supply for electrolytic processes.</p>
5.	<p><b>Illuminations:</b></p> <p>Nature of light, Definitions, Laws of illumination, Different types of lamps, Tungsten lamp, discharge lamp, Sodium vapour lamp, Fluorescent lamp, Design of lighting scheme, methods of lighting, Calculations, examples., Flood lighting, Factory lighting and street lighting, Examples., Conservation approach to be considered.</p>

### Reference Books:

1. Electrical Power Utilization – Taylor. O Longman Publications.
2. Electrical Power Utilization – J. B. Gupta. ( S.K.Kataria & Sons).
3. Electric Traction – H. Partab.Dhanpatrai & sons.
4. Electrical Power Utilization – B.L. Theraja.S chand pub.
5. A text book on Power System Engg. – Soni, Gupta, Bhatnagar, Dhanpatrai & sons.
6. Generation Utilization of Electrical Energy, Pearson Publication.