



# GUJARAT TECHNOLOGICAL UNIVERSITY

Bachelor of Engineering

Subject Code: 3170920

Semester – VII

Subject Name: Industrial Electrical Systems

Type of course: Professional Elective Course

Prerequisite:

Rationale:

Electricity is the major power source for almost all small scale to large scale industries. Per capita consumption of electricity is an indicator of the growth of a country. In view of this, it is important for the electrical engineers to understand the components of residential, commercial and industrial electrical systems. This subject deals with the introduction to components of industrial electrical systems. The subject also includes selection of ratings for various components based on applications and basics of automation of industrial electrical systems.

Teaching and Examination Scheme:

Teaching Scheme			Credits C	Examination Marks				Total Marks
L	T	P		Theory Marks		Practical Marks		
				ESE (E)	PA (M)	ESE Viva (V)	PA (I)	
3	0	0	3	70	30	0	0	100

Content:

Sr. No.	Content	Total Hrs
1	<b>Electrical System Components</b> LT system wiring components, selection of cables, wires, switches, distribution box, metering system, Tariff structure, Protection components- Fuse, MCB, MCCB, ELCB, Symbols for wiring components, Single line diagram (SLD) of a wiring system, Contactor, Isolator, Relays, MPCB, Electric shock and Electrical safety practices	06
2	<b>Residential and Commercial Electrical Systems</b> Types of residential and commercial wiring systems, General rules and guidelines for installation, Load calculation and sizing of wire, Rating of main switch, distribution board and protection devices, Earthing system calculations, Requirements of commercial installation, Deciding lighting scheme and number of lamps, Earthing of commercial installation, Selection and sizing of components	10
3	<b>Illumination Systems</b> Understanding various terms regarding light- lumen, intensity, candle power, lamp efficiency, specific consumption, glare, space to height ratio, waste light factor, depreciation factor, Various illumination schemes, Incandescent lamps and modern luminaries like CFL, LED and their operation, Energy saving in illumination systems, Design of a lighting scheme for a residential and commercial premises, Flood lighting	08
4	<b>Industrial Electrical Systems</b> HT connection, Industrial substation, Transformer selection, Industrial loads, motors, starting of motors, SLD, Cable and Switchgear selection, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type	14



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	of compensation, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components DG Systems, UPS System, Electrical Systems for the elevators, Battery banks, Sizing the DG, UPS and Battery Banks, Selection of UPS and Battery Banks	
5	<b>Industrial Electrical System Automation</b> Study of basic PLC, Role of automation, Advantages of process automation, PLC based control system design, Panel Metering and Introduction to SCADA system for distribution automation	07

## Suggested Specification table with Marks (Theory): (For BE only)

Distribution of Theory Marks					
R Level	U Level	A Level	N Level	E Level	C Level
20	25	25	20	10	-

**Legends: R: Remembrance; U: Understanding; A: Application, N: Analyze and E: Evaluate C: Create and above Levels (Revised Bloom's Taxonomy)**

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

## Reference Books:

1. S. L. Uppal and G. C. Garg, "Electrical Wiring, Estimating & Costing", Khanna publishers, 2008.
2. K. B. Raina, "Electrical Design, Estimating & Costing", New age International, 2007.
3. S. Singh and R. D. Singh, "Electrical estimating and costing", Dhanpat Rai and Co., 1997.
4. H. Joshi, "Residential Commercial and Industrial Systems", McGraw Hill Education, 2008
5. IS Standards : <https://bis.gov.in>

## Course Outcomes:

After completing the course, students will be able to;

Sr. No.	CO statement	Marks % weightage
CO-1	Explain electrical wiring systems for residential, commercial and industrial consumers through symbols, drawings and SLD	20
CO-2	Justify the need of industrial electrical system components and industrial automation	20
CO-3	Evaluate the size, rating and cost of electrical installations for residential and commercial applications	20
CO-4	Design appropriate electrical system with protective equipments for industrial applications	40