FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Electrical Engineering)**

Semester: **VI**

Course Code: **202050605**

Course Title: **Industrial Electrical Systems**

Course Group: **Professional Elective Course-I**

Course Objectives: 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 & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	0	3	50 / 18	50/17	NA	NA	100 / 35

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Electrical System Components:** LT system wiring components, selection of cables, wires, switches, Distribution box, Metering system, tariff structure, protection components- fuse, MCB, MCCB, ELCB, Inverse current characteristics, symbols, Single Line Diagram (SLD) of a wiring system, contactor, isolator, relays, MPCB, electric shock and electrical safety practices, Indian Electricity rules.	08

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in

2	**Residential and Commercial Electrical Systems:** Types of residential and commercial wiring systems, general rules and guidelines for installation, load calculation, Rating of main switch, Service connections, Distribution board and protection devices, Earthing system calculations, Electrical installation for residential building- Estimation and costing of material, Requirements of commercial installation, deciding lighting scheme and number of lamps, earthing of commercial installation, selection and sizing of components.	**10**
3	**Illumination Systems:** 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, floodlighting.	**06**
4	**Industrial Electrical Systems :** Industrial substation, Estimate 11 kV Feeder and substation, Transformer selection, Industrial loads- Electric Heating and Welding, Motors, Starting of Motors, SLD, Lightning Protection, Earthing design, Power factor correction – kVAR calculations, type of compensation, Electrical installation for small industries, Introduction to PCC, MCC panels. Specifications of LT Breakers, MCB and other LT panel components, Introduction to Ring Main Unit (RMU), Introduction to communication technology in power utility.	**10**
5	**Industrial System Utility:** DG Systems, UPS System, electrical systems for the elevators, Sizing of DG, UPS and battery banks, Selection of UPS and battery banks.	**05**
6	**Industrial Electrical System Automation:** Study of basic PLC, Role of in automation, Advantages of process automation, PLC based control system design, Panel metering and Introduction to SCADA system for Distribution automation.	**05**

List of Practicals / Tutorials: NA

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

Supplementary learning Material:	
1	https://electrical-engineering-portal.com/
2	https://www.electrical4u.com/

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in

3	www.nptel.ac.in
4	https://interestingengineering.com/electrical-engineering-salaries-worldwide

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation

Internal Evaluation: The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
25%	25%	20%	20%	10%	0%	

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.

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Explain electrical wiring systems for residential, commercial and industrial consumers through symbols, drawings and SLD.	**30**
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.	**25**
CO-4	Design appropriate electrical systems with protective equipment for industrial applications.	**25**

Curriculum Revision:	
Version:	2.0
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	-
Next Review on (Month-Year):	June-2025

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in

Opp. Shastri Maidan, Beside BVM College, Vallabh Vidyanagar, Dist: Anand, Gujarat - 388120
(O): 02692-238001 | Email: adminoffice@cvmu.edu.in | www.cvmu.edu.in