CVM UNIVERSITY
Aegis: Charutar Vidya Mandal (Estd.1945)

FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

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

Semester: **VI**

Course Code: **202050607**

Course Title: **Elements of Electrical Design**

Course Group: **Professional Elective Course -II**

Course Objectives: This course is a preliminary course for design of various electrical equipment. The aim is to provide the basic principles useful for the subjects related to design in subsequent semesters. The course also includes basics of estimation and costing of house wirings and commercial wirings.

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	2	--	4	50 / 18	50 /1 7	25 / 09	25 / 09	150 / 53

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

Detailed Syllabus:

Sr.	Contents	Hours
1	**General design aspects** Basic principles of magnetic circuits – use of B-H curves in magnetic circuit; Calculations of MMF for air gap and teeth; Real and apparent flux density; Field Form; Air gap flux distribution factor (field form factor); Magnetizing current calculation; Leakage Reactance calculation for various types of slots, Iron loss calculation concepts;	08

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2	**Design of starters, field regulators, choke coils and small transformers** Introduction and review of A.C. and D.C. starters; Schematic diagrams of control circuit and power circuit for starters with contactors and timers. Design of starters and Field regulators, Design of Small single-phase transformers; Design of variable air gap single phase and three phase choke coil	**12**
3	**Design of winding** DC windings: Simplex & Duplex windings; Lap & Wave windings; Applications; Basic terms related to armature windings; Dummy Coils; Equalizer connections; Split coils. AC windings: Introduction; No. of phases; Phase spread; Concentric winding, Mush winding; Double layer windings; Integral slot lap and wave winding; Fractional slot lap and wave windings	**12**
4	**Design consideration of Electrical Installation its Estimation and Costing** Types of load, Wiring systems, Permissible voltage drops & Conductor size calculations, Design of control panel, Preparation of schematic diagrams and estimation of cost of wiring for residential and commercial buildings	**10**

List of Practicals / Tutorials:

1	Study of Manual and Automatic Starters Used for DC Motors.
2	Study of Manual Starters Used for 3-Phase Induction Motors.
3	Study of Automatic Starters Used for 3-Phase Induction Motors.
4	Design of Resistance starters and Field Regulators.
5	Design of Small 1-Phase Transformer and Choke Coil.
6	Design of 1-Phase and 3-Phase Variable Choke Coils.
7	Lap and Wave Windings Used in DC Machines.
8	Single Layer Mush and Double Layer Lap and Wave Windings Used in AC Machines.
9	Estimation and Costing for Residential and Commercial Wiring.
10	Design Consideration of Electrical Installation.

Reference Books:

1	A course in electrical machine Design – A. K. Sawhney
2	Electrical Machine Design – R. K. Agrawal
3	Design of Electrical Machine - V. N. Mittle
4	Elements of Electrical Design – J G Jamnani.
5	Electrical Design, Estimating and Costing – K. B. Raina

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

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3	www.nptel.ac.in

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods
- Seminar/Poster Presentation
- Industrial/ Field visits
- Course Projects

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**	
20%	30%	20%	10%	10%	10%	

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.

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Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Study the basic concepts related to design of electrical apparatus	**25**
CO-2	Design the starters, field regulators, small transformers and choke coils.	**25**
CO-3	Develop the winding diagrams for AC and DC machines as per specifications	**25**
CO-4	Design & Estimate the cost of wiring for residential and commercial premises and 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

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