



## FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2025-26

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

**Semester:** I

**Course Code:** 102001223

**Course Title:** Basics of Electrical, Electronics and AI

**Course Group:** Engineering Science

**Course Objectives:** Electricity has been the main source of energy for the developing and developed countries. Per capita consumption of electricity of a country can be considered as an indicator of the development of the country with rise in usages of electronics systems and AI. In view of this, it is essential for all engineering graduates to know the basic aspects of electrical, electronics and computer engineering. This subject deals with basic electrical circuits solution methods, semiconductors, electronics devices, introduction to AI and machine learning.

### Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
Lecture	Tutorial	Practical		Theory		J/V/P*		Total
				Internal	External	Internal	External	
2	0	4	4	50 / 18	50/18	25/9	25/9	150 / 54

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

### Detailed Syllabus:

Sr.	Contents	Hours
-	<b>Course Introduction</b>	<b>01</b>
1	<b>DC Circuits:</b> Electrical circuit elements (R, L and C), voltage and current sources, Ohm's law, Kirchhoff's current and voltage laws, star-delta transformation. <b>Electromagnetism:</b> Faraday's laws, Lenz's law, self-induction, mutual induction. <b>Electrostatics:</b> Coulomb's laws, Capacitor, capacitance of parallel plate capacitor, DC response of RC circuits.	<b>04</b>



2	<b>AC Circuits:</b> Representation of sinusoidal waveforms, peak, average and RMS values, phasor representation of AC quantities, real power, reactive power, apparent power, power factor. Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations, series resonance. <b>Three-phase Circuits:</b> Three-phase balanced circuits, voltage and current relations in star and delta connections. Working principle and construction of single-phase and three-phase transformers.	06
3	<b>Semiconductor Devices and Applications:</b> PN Junction Diode Characteristics Clipper and Clamper Circuits, Rectifiers – Half wave, Full Wave and Bridge – Voltage regulations; Transistor Operations, Configuration and Characteristics. <b>Bipolar Junction Transistor – DC Biasing:</b> Introduction, Operating Point, Fixed Bias Configuration, Emitter-Bias Configuration, Voltage-Divider Bias Configuration.	08
4	<b>Introduction to AI</b> What is Artificial Intelligence? Strong Versus Weak AI, The Turing Test, Definition of the Turing Test, AI and games, Major parts of AI. <b>Introduction to Machine Learning</b> What is machine learning, Types of machine learning algorithms, Machine learning tasks, Linear regression and Logistic regression.	08

### List of Practical:

#### Laboratory: 1

1	Demonstration of electrical components and understand their symbols.
2	To measure electrical parameters of electrical circuit/instrument.
3	To verify Kirchhoff's Current Law (KCL) & Kirchhoff's Voltage Law (KVL).
4	To observe the different effects of Faraday's law and electromagnetic induction.
5	To study and verify star-delta transformation method.
6	To observe the DC response of series RC circuits.
7	To analyze AC series RL circuits.
8	To analyze AC series RC circuits.
9	To observe resonance in AC series RLC circuits.
10	To verify the current and voltage relationships in 3-phase star-delta connections.
11	Demonstration of single-phase and three-phase transformer components.
12	To measure three-phase power using two-wattmeter method.

#### Laboratory: 2

1	To verify the performance of various Clipper and Clamper circuits.
2	To study the characteristics and operation of full-wave rectifier with filter circuits.
3	To study Zener diode as a voltage regulator.
4	To study Fixed Bias and Voltage Divider biasing circuits.
5	To study and demonstrate various modulation techniques: AM, FM, PM.
6	To study telephonic wired communication system.
7	To study wired and wireless communication.
8	To study Optical fiber communication.



9	Explore various datasets available on Kaggle and categorize them into two types: Classification and Regression (at least 10 datasets).
10	Identify and categorize different machine learning models based on their learning type - Supervised Learning and Unsupervised Learning.
11	Study of AI applications in daily life and their real-world impact.
12	Implementation of Linear Regression to analyze data trends and predictions.

### Reference Books:

1	B. L. Theraja, "Electrical Technology –Part I and II", S. Chand and Co.
2	R. P. Singh, "Basic Electrical Engineering", McGraw Hill.
3	N. N. Bhargava, "Basic Electronics and Linear Circuits", McGraw Hill, New Delhi.
4	V. K. Mehta, "Principles of Electronics", S. Chand and Company Ltd., New Delhi.
5	E. Balagurusamy, "Fundamentals of Computers", Tata McGraw Hill Company Ltd.
6	R. S. Salaria, "Fundamentals of Computers" Salaria Publishing House.
7	O. Campesato, Artificial Intelligence, Machine Learning and Deep learning.

### Supplementary learning Material:

1	<a href="https://archive.nptel.ac.in/courses/108/105/108105112/">https://archive.nptel.ac.in/courses/108/105/108105112/</a>
2	<a href="https://www.electrical4u.com/">https://www.electrical4u.com/</a>
3	<a href="http://www.allaboutcircuits.com">www.allaboutcircuits.com</a>
4	<a href="https://electrical-engineering-portal.com/">https://electrical-engineering-portal.com/</a>

### Pedagogy:

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

**Internal Evaluation:** The internal evaluation comprised of written exam (50% weightage) along with combination of various components such as certification courses such as ELT, Assignments, Model making, Case study, Group activity, Poster Presentation, Unit test/Quiz, Class Participation, Attendance 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%	25%	15%	5%	5%	

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.



**CVM**  
**UNIVERSITY**

Aegis: Charutar Vidya Mandal (Estd.1945)

**Course Outcomes (CO):**

Sr. No.	Course Outcome Statements	%weightage
CO-1	Apply fundamental electrical laws and circuit theorems to DC circuits.	15
CO-2	Analyze single-phase and three-phase AC circuits.	25
CO-3	Understand semiconductors of electronic fundamentals.	35
CO-4	Understand AI and machine learning fundamentals.	25

**Curriculum Revision:**

Version:	1.0
Drafted on (Month-Year):	April - 2025
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	April - 2028