

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus – CBCS
AY 2025 -2026

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2025 -2026 - First Year Syllabus

Course Title	BASICS OF ELECTRICAL ENGINEERING						
Course Code	1BEET205						
Category	PROGRAMME SPECIFIC COURSES (PSC)						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	03	00	00	00	03	40	03
CIE Marks: 50	SEE Marks: 50	Total Max. marks = 100			Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I	8 hours
DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Problems.	
Electrostatics: Coulombs law, definitions of absolute and relative permittivity, electric field, electric flux, electric field strength, flux density. Capacitor: Expression of parallel plate capacitor, factors affecting capacitance, capacitors in series and capacitors in parallel, energy stored in an electrostatic field, problems.	
Electromagnetism: Electromagnets-direction of flux produced, right-hand rule, definition-magnetic circuit, mmf, magnetic field strength, free space and relative permeability, reluctance, permeance, useful and leakage flux, simple series circuits and parallel circuit problems.	
UNIT II	8 hours
Electromagnetic Induction: Faraday's law of electromagnetic induction, Lenz's law, dynamically and statically induced emf, Fleming's right-hand rule. Simple problems. Inductance and mutual inductance, coefficient of coupling, energy stored and its applications. Force experienced by a current-carrying conductor placed in the magnetic field. Fleming's left-hand rule. Force between conductors carrying current in the same and in the opposite directions.	
UNIT III	8 hours
Single-phase Circuits: Generation of sinusoidal voltage, frequency of generated voltage, Expression of average value, RMS value, form factor and peak factor of sinusoidal voltage and current. Phasor representation of alternating quantities. Analysis of R, L and C circuits. Series and parallel R-L, R-C and R-L-C circuits with phasor diagrams, calculation of real power, reactive power, apparent power, and power factor, illustrative examples.	
UNIT IV	8 hours
Three- phase Circuits: Generation of three-phase system, definition of phase sequence, star and delta (mesh) connections, relation between phase and line values of voltages and of currents of star and delta connections, considering the phasor diagram. Definition of balanced and unbalanced source and load. Power, reactive power and power factor. Problems on balanced loads. Measurement of 3-phase power by 2-wattmeter method. Expression of power factor in terms wattmeter readings. Effect of power factor on wattmeter readings. Comparison between single phase and three-phase systems.	

UNIT V**8 hours**

Domestic Wiring: Service mains – overhead and underground. Types of wiring: Exposed to open space – wooden batten wiring and casing and capping. Concealed wiring: conduit wiring. Wiring for two-way and three-way control of load.

Domestic Electricity Bill: Power-rating of household connected loads. Sanctioned Load. Practical unit of measuring energy, energy expressed for commercial purposes - Unit, its definition.

Electricity bill [as per Electricity Supply Companies (escoms)]: Tariff method considered: two-part tariff. Particulars considered for billing: sanctioned load and units consumed. Calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principles of fuse and miniature circuit breaker (MCB), the merits and demerits of fuse and MCB.

Personal safety measures: Electric shock, possible effects of shocks. Safety precautions to avoid personal shock while dealing with electricity. Permanent measure: Earthing: Pipe and plate.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, video

COURSE OUTCOMES: On completion of the course, student should be able to:

CO1. Apply the basic laws used in the analysis of DC circuits, Electrostatics and Electromagnetism.

CO2. Assess implications of electromagnetic induction.

CO3. Analyse the single phase circuits.

CO4. Analyse the three phase circuits and measure power.

CO5. Explain electricity billing, domestic wiring and safety measures against electricity.

TEXTBOOKS:

1. A textbook of Electrical Technology by B.L. Theraja, Volume-1, S Chand and Company, Reprint Edition 2014. [Covers modules 1 to 4]

2. Basic Electrical Engineering, D.C. Kulshreshtha, McGraw Hill, 2nd Edition, 2024. [Covers all modules]

REFERENCE BOOKS:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill 2nd edition, 3rd Reprint 2024.

2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.

3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.

4. Basic Electrical and Electronics Engineering, S.K Bhattacharya, et al, Pearson. 2nd edition, 2017.

5. Handbook of Electrical Engineering formulae, Harish C Rai, CBS Publications, 2018.

ONLINE RESOURCES

Web links and Video Lectures (e-Resources): www.nptel.ac.in

(1)Principle of Electrical Sciences, Prof Sanjay Agrawal, Indira Gandhi National Open University.

(2)Electricity and Electrical Wiring, Dr. Antara Mahanta Barua, Krishna Kanta Handiqui State Open University, Guwahati.

SCHEME FOR EXAMINATIONS

(i) The question paper will have ten full questions carrying equal marks.

(ii) Each full question will be for 20 marks.

(iii) There will be two full questions from each module

(iv) Each full question will have sub-questions (subject to a maximum of four sub-questions)

(iv) The students have to answer five full questions, selecting one full question from each module.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2											3		
CO 2	3	2											3		
CO 3	3	3	2										3	2	
CO 4	3	3	2										3	2	
CO 5	2					3	2	2		2					3

Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Electrical and Electronics Engineering
Syllabus - CBCS – for AY 2025 -2026- First Year Syllabus

Course Title	BASIC ELECTRICAL ENGINEERING LABORATORY						
Course Code	1BEEL206						
Category	PROGRAM-SPECIFIC COURSE LAB						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	00	00	02	00	02	26	01
CIE Marks: 50	SEE Marks: 50	Total Max. marks = 100			Duration of SEE: 03 Hours		

COURSE OBJECTIVE:

1. To verify fundamental electrical laws and principles through practical experiments on DC and AC circuits.
2. To measure electrical parameters such as resistance, inductance, impedance, power, and power factor using standard instruments.
3. To develop skills in three-phase power measurement and analysis of star- and delta-connected loads.
4. To practice safe wiring methods, load control, and earth resistance measurement.
5. To identify, analyze, and troubleshoot faults in simple electrical circuits using appropriate techniques.

PART - A

- (1) Verification of Ohm's law and Kirchhoff's laws.
- (2) Measurement of low range resistance using voltmeter-ammeter method. Verification of resistance value using multimeter/LCR meter.
- (3) Measurement of earth's resistance by 3-electrode method.
- (4) Measurement of resistance, inductance, impedance and power factor using voltmeter, ammeter and wattmeter in single-phase AC circuits.
- (5) Measurement of three-phase power of an inductive load by 2-wattmeter method, when the load is (a) star connected and (b) delta connected. Calculation of resistance, reactance, impedance and power factor.
- (6) Wiring an appropriate electric circuit, understanding the basic principle used for 2-way and 3-way control of load.

PART - B

- (1) Creation of short circuit to determine the time taken by a fuse of different length. Documenting the test data and the conclusions.
- (2) Trouble shooting experiments in simple DC circuits. The trouble may be due to loose connection, faulty component leading to open circuits or short circuits. Detection of fault and the reasons for that and conclusion.
- (3) Measurement of voltage between line and neutral, ground and line, ground and neutral in respect of healthy and unhealthy 3-pin socket. Conclusions arrived for the faulty wiring. Allowable ground voltage.
- (4) A 12 V battery is available. It is required to obtain 3 V from the battery to charge a mobile. Create a circuit to obtain the required voltage. Specify all the ratings of the components used.
- (5) Only three ammeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.
- (6) Only three voltmeters and standard resistance are available in the laboratory. Using the same measure the single phase power consumed by an inductive load.

COURSE OUTCOMES: On completion of the course, student should be able to:

- CO1: Conduct standard electrical experiments to verify theoretical principles.
CO2: Measure key electrical parameters such as resistance, inductance, impedance, power, and power factor with standard methods.
CO3: Design and perform experiments to solve practical open-ended electrical problems.

CO4: Analyse experimental data from non-routine method to arrive at a solution.

TEXT BOOKS

1. Manual prepared for the conventional experiments by EEE Departments.

MAPPING of COs with POs and PSOs

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO 1	3	2											3		
CO 2	3	2			2								3	2	
CO 3	3	3	2		2				2				3	3	2
CO 4	2	3		3	2								2	3	
Strength of correlation: Low-1, Medium- 2, High-3															

