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	**INTRODUCTION TO ELECTRICAL ENGINEERING**						
Course Code	**1BEST104B**						
Category	**Engineering Science Course (ESC)**						
Scheme and Credits	No. of Hours/Week					Total teaching hours	Credits
	L	T	P	SS	Total		
	3	**0**	**0**	**0**	**03**	**40**	**03**
CIE Marks**: 50**	SEE Marks**: 50**		Total Max. marks **= 100**		Duration of SEE**: 03** Hours		

COURSE OBJECTIVE:

1. Describe the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Make use of three phase system of power supply
4. Predict the values of electrical parameters and quantities.
5. Explain electric, wiring schemes and equipment and personal safety measures.

UNIT I **8 hours**

Power Generation: Conventional and nonconventional energy sources. Single-line diagram of power supply system showing power station, transmission system and distribution system. Definition of power grid.

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series-parallel circuits. Power and energy. Problems.

UNIT II **8 hours**

Single-Phase Circuits: Generation of single-phase system. Equation of AC voltage and current, average value, RMS value, form factor, peak factor and their relation [No derivations]. Voltage and current relationships in R, L and C circuits, concept of power, reactive power, apparent power and power factor, analysis of R-L, R-C and R-L-C series circuits, parallel circuits, illustrative examples.

Three-Phase Circuits: Generation of three-phase systems, star and delta (mesh) connections, relation between phase and line values of voltages and of currents of star and delta connections. Definition of balanced and unbalanced source and load. Power, reactive power and power factor. Problems with balanced loads.

UNIT III **8 hours**

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple problems.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control of DC shunt motor. Applications of DC motors. Simple problems.

UNIT IV **8 hours**

Transformers: Introduction to transformers, necessity of transformer, principles of operation, constructional features of single phase transformers. EMF equation, losses, variation of losses with respect to load. Calculation of efficiency at different loads.

Three-phase induction Motors: Definition of rotating magnetic field (without derivation), Principle of operation. Constructional features of squirrel cage type and wound rotor type induction motor. Slip and its significance, problems. Applications.

UNIT V **8 hours**

Domestic Wiring: Two-way and three-way control of loads.

Electricity Bill: Definition of "unit" used for consumption of electrical energy, power rating of common household appliances. Two-part electricity tariff.

Equipment Safety measures: Working principle of fuse and miniature circuit breaker (MCB), merits and

demerits.

Personal safety measures: Electric shock, safety precautions to avoid shock. Earthing and types: Plate earthing and pipe earthing.

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

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

CO1. Explain the generation of power and the laws used in DC circuits.
CO2. Analyse single-phase and three-phase circuits.
CO3. Describe the construction, operation and applications of DC machines.
CO4. Describe the construction, operation and applications of transformers and induction motors.
CO5. Explain electricity billing and safety measures

TEXTBOOKS

1. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.

REFERENCE BOOKS

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.0
2. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.
3. Electrical Technology by E. Hughes, Pearson, 12th Edition, 2016.
4. Basic Electrical and Electronics Engineering, K.Vijayarekha, et al, Cengage. Reprint 2023.
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)
v. 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	3											3		
CO 3	3	2	2										3		
CO 4	3	2											3		
CO 5	2					3	2	2		2					3

Strength of correlation: Low-1, Medium- 2, High-3

Dr Ambedkar Institute of Technology, Bengaluru-56
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Syllabus - CBCS – for AY 2025 -2026 - First Year Syllabus

Course Title	**INNOVATION AND DESIGN THINKING LAB**						
Course Code	**1BIDL108**						
Category	**ABILITY ENHANCEMENT COURSE/SKILL DEVELOPMENT COURSE**						
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 explain the concept of design thinking for product and service development.
2. To explain the fundamental concept of innovation and design thinking.
3. To discuss the methods of implementing design thinking in the real world.

Week 1, 2 & 3: Orientation and Team Formation
Week -1&2: Introduction to Social Entrepreneurship, Innovation and Design Thinking Group discussion on What is Innovation vs Invention. Why Design Thinking is important. Brief about 5 stages: Empathize – Define – Ideate – Prototype – Test. Week -3: Innovation warm-up activities, forming interdisciplinary teams, Instructions about Next week activities
Week 4–5: Empathy and Field Exploration
Week-4&5: Field (any public places of student's interest Eg- Village, Government Office, Industry. R&D institute, NGO etc) visits, stakeholder interviews and interaction. Recording all interaction through handwritten in activity book prescribed by the University.
Week 6, 7 and 8: Problem Definition
Week-6: Documentation, categorization and Group discussion on interactions and problems/challenges. Week-7&8: Problem framing using "How Might We" approach, Identification of social problems and user insights through affinity Clustering and Problem Tree. Mention of clearly defined challenge statements.
Week 9, 10 &11: Ideation Sprint
Week-9&10: Presentation by teams on Defined Problems, Brainstorming interactions and Mind Mapping. Week-10: Idea Filtering - Shortlist of creative, eco -friendly and feasible ideas. Selection of one Suitable IDEA for next process, Designing/Structuring of Prototype model.
Week 12, 13 &14: Rapid Prototyping using Atal Idea Lab/Makers Space
Week-12&13: Building low-fidelity and working models using tools like Arduino, 3D printers,: Digital fabrication, electronics kits and recycled materials Week-14: User testing, Feedback collection, Iteration - Observation Notes, Feedback Forms (Designing a business model for impact and scalability, if possible) Preparation of Draft of social venture plan
Week 15 &16: Final Demo and Social Pitch
Innovation showcase, Poster display, Project pitching to jury Presentation of the project with impact with assessment, prototype, and sustainability plan

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

CO1: Empathize with community problems and define meaningful challenges.
CO2: Apply design thinking principles and multidisciplinary skills to develop user-centric solutions.
CO3: Build and test basic prototypes using tools available in the Atal Idea/Tinkering Lab or Makers Space.

CO4: Pitch socially relevant ideas with scalable models.
CO5. Collaborate effectively in diverse teams.

TEXT BOOKS

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson "Engineering Design", Cengage learning (International edition), 2nd Edition, 2013.
2. Roger Martin "The Design of Business: Why Design Thinking is the Next Competitive Advantage" ,Harvard Business Press, 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), Design Thinking: Understand – Improve Apply, Springer, 2011.
4. Idris Mootee "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons),2013

REFERENCE BOOKS

1. Yousef Haik and Tamer M.Shahin "Engineering Design Process" Second Edition , Cengage Learning, 2011.
2. Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author), "Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover" 20 Sep 2013.

ONLINE RESOURCES

1. www.tutor2u.net/business/presentations/. /productlifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit
6. www.vertabelo.com/blog/documentation/reverse-engineering https://support.microsoft.com/en-us/kb/273814
7. https://support.google.com/docs/answer/179740?hl=en

SCHEME FOR EXAMINATIONS

Examination type (SEE): Practical/Presentation/Seminar

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	2						3		2
CO 2	2		3	2			2						2	3	2
CO 3			2		3								2	3	
CO 4						2	2			3	2			2	3
CO 5									3	2				2	3

Strength of correlation: Low-1, Medium- 2, High-3

Continuous Internal Evaluation (CIE) –
CIE Parameters (50 Marks)

Sl. No.	CIE Component/Week	Marks	Description	
1	Orientation Activities & Communication Skills	5	Participation in Week 1–3 orientation, communication and teamwork skill-building exercises.	
2	Empathy & Field Exploration Documentation	10	Quality and completeness of field visit reflections, stakeholder interviews, and activity book.	

3	Problem Definition and Framing	10	Clarity of challenge statements, use of "How Might We", Affinity Mapping, Problem Trees.	
4	Ideation & Mind Mapping	5	Participation in brainstorming, mind mapping, idea filtering sessions.	
5	Prototype Development & Iteration	10	Quality and creativity of prototype/model, user testing, feedback collection, iterations.	
6	Final Presentation & Pitch	5	Project pitching, poster presentation, storytelling and scalability model.	
7	Teamwork, Journal, and Engagement	5	Peer and mentor evaluation of participation, teamwork, journal updates.	
8	Total CIE marks	50	Final CIE marks to be considered	

*Minimum to Qualify for SEE: 20 out of 50 in CIE

Semester End Examination (SEE) –
SEE to be conducted in batches where the students will exhibit their projects along with the presentation and Viva -voce. – 100 Marks
"SEE shall be conducted by one Internal and one External Examiner"

Sl. No.	Evaluation Parameter	Marks	Details	
1	Prototype / Solution Demonstration	30	Working functionality, creativity, use of lab tools, relevance to the problem.	
2	Final Presentation / Social Pitch	20	Clarity, storytelling, problem-solution fit, communication, visual aids.	
3	Business Model or Sustainability Plan	10	Feasibility, cost-effectiveness, scalability, and alignment with SDGs.	
4	Viva Voce	20	Individual understanding, contribution, tools used, learning outcomes.	
5	Documentation Report / Portfolio	20	Project report, reflection, team activity log, stakeholder input summaries.	

Submission Requirements:

• Handwritten activity book with CIE marks and Final project report (Typed or Handwritten).

• Final presentation ppt/pdf (hard and soft copy).

• Prototype or working model [physical or conceptual (shall be drawn/sketched clearly on card sheet paper)].

• Peer/team feedback and reflection entries (if applicable).