Maharashtra State Board of Technical Education, Mumbai
LABORATORY PLAN (LP)
Academic Year: 2025–26

K-2

Date: 15/12/2025

Institute Name &Code: K. K. Wagh Polytechnic, Nashik (0078)

Programme and Code: Electrical Engineering (EE)   **Course Index:** 204

Course Name: Fundamentals of Electrical Engineering   **Course Code**: 312310

Semester: II   **Scheme**: 'K'   **Allocated Hrs:** 60   **Name of Faculty**: Mr.J.M.Patil

Class: FYEE-Ohm

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- ## Teaching and Examination Scheme:

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme														Total Marks
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL			
				CL	TL	LL					FA-TH	SA-TH	Total		Practical				SLA			
															FA-PR		SA-PR					
											Max	Max	Max	Min	Max	Min	Max	Min	Max	Min	
312310	FUNDAMENTAL OF ELECTRICAL ENGINEERING	FEE	DSC	4	-	4	2	10	5	3	30	70	100	40	25	10	25#	10	25	10	175

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- Class Room Learning, TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS – Indian Knowledge System, SLA - Self Learning Assessment Legends: @ Internal Assessment, # External Assessment, *# On Line Examination, @$ Internal Online Examination

Note:

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.

2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.

3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.

4. Notional Learning hours for the semester are (CL+LL+TL+SL) hrs.* 15 Weeks

5. 1 credit is equivalent to 30 Notional hrs.

6. * Self learning hours shall not be reflected in the Time Table.

7. * Self learning includes micro project / assignment / other activities.

- # Course Objectives:

  - CO1 - Determine various parameters used in electric circuit.
  - CO2 - Use basic laws of electrical engineering in D.C. Circuits.
  - CO3 - Use capacitor and battery in electrical circuits.
  - CO4 - Use principles of magnetism in Magnetic Circuits.
  - CO5 - Apply Laws of electromagnetism in electrical circuit and systems.

- # Course Outcomes (COs): Theory & Practical

By learning course Fundamentals of Electrical Engineering (FEE-312310), First Year students will be able to::

CO No.	CO No.	Course Outcomes (COs) / Unit Outcomes (UOs)
CO204.1	CO1	**Determine various parameters used in electric circuit** TLO 1.1 Interpret the given electric parameters. TLO 1.2 Explain the given terms of electric circuit. TLO 1.3 Explain the given effect of the electric current TLO 1.4 Calculate work, power and energy for the given circuit.

CO204.2	CO2	**Use of basic laws of electrical engineering in DC circuits.** TLO 2.1 Apply Ohm's law to calculate internal resistance of the given circuit. TLO 2.2 Calculate equivalent resistance for the given circuit. TLO 2.3 Categorize the given type of network TLO 2.4 Apply the Kirchhoff's current law and Kirchhoff's voltage law to calculate the electrical quantities in the given circuit.
CO204.3	CO3	**Use capacitor and battery in electrical circuits** TLO 3.1 Describe the construction of the given type of capacitor. TLO 3.2 Explain the working of the capacitor in the given circuit. TLO 3.3 Calculate equivalent capacitance in the given D.C. circuit. TLO 3.4 Define Battery and state its types and connections TLO 3.5 Plot charging and discharging curves for the given capacitor and battery.
CO204.4	CO4	**Use principles of magnetism in Magnetic Circuits.** TLO 4.1 Interpret the terms related to a magnetic circuit. TLO 4.2 Calculate various parameters of the given magnetic circuit. TLO 4.3 Compare the series and parallel magnetic circuit based on the given criteria. TLO 4.4 Plot B-H curve and hysteresis loop of the given magnetic materials.
CO204.5	CO5	**Apply Laws of electromagnetism in electrical circuit and systems.** TLO 5.1 Describe the use of Faraday's laws of electromagnetic induction in the given application. TLO 5.2 Distinguish between the given types of e.m.fs. TLO 5.3 Apply Faraday's laws to calculate induced e.m.f. in the given circuit. TLO 5.4 Calculate self-inductance and energy stored in the magnetic field of the given circuit.

• **Laboratory Plan**

Sr. No.	CO	LLO	Name of Experiment	Planned Date		Actual Date	Remark/ Assessment Date with Staff sign
				From	**To**		
1.	CO-1	LLO1.1	Preparation of Layout of Electrical Engineering Laboratory.	A-15/12/2025 B-16/12/2025 C-17/12/2025	A-15/12/2025 B-16/12/2025 C-17/12/2025		
2.	CO-1	LLO2.1	Operation of fire extinguisher and preparation of safety rules charts	A-18/12/2025 B-19/12/2025 C-20/12/2025	A-18/12/2025 B-19/12/2025 C-20/12/2025		
3.	CO-1	LLO3.1	Check lab supply system and make use of relevant electric tools for various Applications.	A-22/12/2025 B-23/12/2025 C-24/12/2025	A-25/12/2025 B-26/12/2025 C-27/12/2025		
4.	CO-1 CO-2	LLO4.1	Verification of Ohm's Law	A-29/12/2025 B-30/12/2025 C-31/12/2025	A-01/01/2026 B-02/01/2026 C-03/01/2026		
5.	CO-1	LLO5.1	Read analog meters for measurement of various electrical quantities in AC/DC Circuits.	A-05/01/2026 B-06/01/2026 C-07/01/2026	A-05/01/2026 B-06/01/2026 C-07/01/2026		
6.	CO-1 CO-2	LLO6.1	Use of Multimeter and Clip-On meter for the measurement of AC/DC Current, Voltage and Resistance in the given circuit.	A-08/01/2026 B-09/01/2026 C-10/01/2026	A-12/01/2026 B-13/01/2026 C-25/01/2026		
7.	CO-1 CO-2	LLO7.1	Measurement of frequency, Time Period, Peak Value and Average Value of the given A.C. wave on CRO.	A-15/01/2026 B-16/01/2026 C-17/01/2026	A-15/01/2026 B-16/01/2026 C-17/01/2026		

No.	CO	LLO	Experiment		
8.	CO-1	LLO8.1	Verification of Kirchhoff's Voltage Law	A-19/01/2026 B-20/01/2026 C-21/01/2026	A-19/01/2026 B-20/01/2026 C-21/01/2026	
9.	CO-1 CO-2	LLO9.1	Verification of Kirchhoff's Current Law	A-22/01/2026 B-23/01/2026 C-24/01/2026	A-22/01/2026 B-23/01/2026 C-24/01/2026	
10.	CO-1 CO-2	LLO10.1	Use of rheostat as current regulator and potential divider	A-29/01/2026 B-30/01/2026 C-31/01/2026	A-29/01/2026 B-30/01/2026 C-31/01/2026	
11.	CO-1 CO-2	LLO11.1	Determination of PD, EMF and internal Resistance of DC source.	A-02/02/2026 B-03/02/2026 C-04/02/2026	A-02/02/2026 B-03/02/2026 C-04/02/2026	
12.	CO-1 CO-2	LLO12.1	Verification of parameters of two/three resistances connected in series Connection.	A-05/02/2026 B-06/02/2026 C-07/02/2026	A-05/02/2026 B-06/02/2026 C-07/02/2026	
13.	CO-1 CO-2	LLO13.1	Verification of parameters of two/three resistances connected in Parallel connection.	A-09/02/2026 B-10/02/2026 C-11/02/2026	A-12/02/2026 B-13/02/2026 C-14/02/2026	
14.	CO-1 CO-3	LLO14.1	Plot the charging characteristics of capacitor and find the time constant(RC)	A-16/02/2026 B-17/02/2026 C-18/02/2026	A-16/02/2026 B-17/02/2026 C-18/02/2026	
15.	CO-1 CO-3	LLO16.1	Verification of the equivalent capacitance in series connected circuits	A-19/02/2026 B-20/02/2026 C-21/02/2026	A-19/02/2026 B-20/02/2026 C-21/02/2026	
16.	CO-1 CO-3	LLO17.1	Verification of the equivalent capacitance in parallel connected circuits	A-23/02/2026 B-24/02/2026 C-25/02/2026	A-23/02/2026 B-24/02/2026 C-25/02/2026	
17.	CO-4	LLO20.1	Plot B-H curve for the given magnetic Material.	A-26/02/2026 B-27/02/2026 C-28/02/2026	A-26/02/2026 B-27/02/2026 C-28/02/2026	
18.	CO-4	LLO21.1	Plot magnetization curve for magnetic core	A-02/03/2026 B-03/03/2026 C-04/03/2026	A-05/03/2026 B-06/03/2026 C-07/03/2026	
19.	CO-4	LLO22.1	Study of Hysteresis loop for the given Transformer coil.	A-09/03/2026 B-10/03/2026 C-11/03/2026	A-12/03/2026 B-13/03/2026 C-14/03/2026	
20.	CO-4 CO-5	LLO23.1	Verification of Faraday's Law of Electromagnetic Induction (Statically Induced EMF)	A-16/03/2026 B-17/03/2026 C-18/03/2026	A-16/03/2026 B-17/03/2026 C-18/03/2026	
21.	CO-4 CO-5	LLO24.1	Verification of Faraday's Law of Electromagnetic Induction (Dynamically Induced EMF)	A-19/03/2026 B-20/03/2026 C-21/03/2026	A-23/03/2026 B-24/03/2026 C-25/03/2026	
22.	CO-1 CO-3	LLO27.1	Plot the Charging and discharging Curves of Battery	A-26/03/2026 B-27/03/2026 C-28/03/2026	A-26/03/2026 B-27/03/2026 C-28/03/2026	

- **Experiment wise LLO-CO Mapping:**

	LLO	CO204.1	CO204.2	CO204.3	CO204.4	CO204.5
Experiment No. 1	**LLO1.1**	✓				
Experiment No. 2	**LLO2.1**	✓				
Experiment No. 3	**LLO3.1**	✓				
Experiment No. 4	**LLO4.1**	✓	✓			
Experiment No. 5	**LLO5.1**	✓				
Experiment No. 6	**LLO6.1**	✓	✓			
Experiment No. 7	**LLO7.1**	✓	✓			
Experiment No. 8	**LLO8.1**	✓		✓		
Experiment No. 9	**LLO9.1**	✓	✓	✓		

Experiment	LLO					
Experiment No. 10	LLO10.1	✓	✓		✓	
Experiment No. 11	LLO11.1	✓	✓		✓	
Experiment No. 12	LLO12.1	✓	✓			✓
Experiment No. 13	LLO13.1	✓	✓			
Experiment No. 14	LLO14.1	✓	✓			
Experiment No. 15	LLO16.1	✓	✓	✓		
Experiment No. 16	LLO17.1	✓		✓		
Experiment No. 17	LLO20.1				✓	
Experiment No. 18	LLO21.1				✓	
Experiment No. 19	LLO22.1				✓	
Experiment No. 20	LLO23.1				✓	✓
Experiment No. 21	LLO24.1				✓	✓
Experiment No. 22	LLO27.1	✓		✓		

- **Direct Assessment Criteria:**
  - ## Rules for Practical Assessment:
    - Progressive assessment of each practical is based on Process related (15 marks) and Product related (10 marks) - Total out of 25 marks as per the assessment scheme prescribed in manual given by MSBTE, Mumbai.
    - The Performance Indicators of each practical is assessed according to product and process related skills. Sample format given below:

Assessment Scheme for Each Practical:

Sr. No	Performance Indicators	Weightage in %
	Process Related(15 Marks)	**60%**
1	Effective Practical Implementation with Specified Time	25%
2	Effective Handling of Network Component	25%
3	Follow Ethical Practices	10%
	Product Related(10 Marks)	**40%**
4	Correctness of Practical Implementation	15%
5	Timely Submission OF Practical	15%
6	Answer to Sample Question	10%
	Total(25 Marks)	**100%**

  - Final Formative Assessment (FR PR) of 25 marks is calculated based on Progressive Assessment for each experiment. *Formative Assessment Marks = ((Total Marks Obtained in P.A.) / (25*Total Number of Experiments))*25*
  - A comprehensive Final Practical Summative Assessment Semester examination (of 25 Marks) will be conducted by MSBTE at the end of semester. Examiner for this examination External Examiner will be appointed by MSBTE.The schedule of MSBTE Practical Examination will be display on Notice board prior to examination

- # References:
  1. **Books :**

Sr. No	Title	Author	Publisher
01	Basic Electrical Engineering	Mittal V.N..	Tata McGraw Hill Education. New Delhi ISBN : 9789129214405
02	Electrical Technology Vol-I	Theraja B.L.	S.Chand and Co.Ltd., New Delhi ISBN : 9788121924375
03	Electrical Technology	Edward Hughes	Pearson Publications., New Delhi ISBN : 9788120329973 Vi
04	Fundamentals of Electrical Engineering	Saxsena S.B.Lal	Cambridge University Press,New Delhi ISBN 9781107464353

2. Web References:
1. https://www.nptel.ac.in
2. https://www.wikipedia.com
3. https://www.electricaltechnology.org
4. https://www.howstuffworks.com
5. https://www.electrical4u.com

3. URLs of Referred Videos :
1. .https://youtu.be/JMjqizv98bw
2. https://youtu.be/j4b_fzvG4DY
3. https://youtu.be/LhkJxkz-NAI
4. https://youtu.be/oVuRa4dW7Gg
5. https://youtu.be/eVRu8rKQ_Mo
6. https://www.electrical4u.com/electrical-engineering-articles /basic-electrical/ Basic Electrical Parameters
7. https://en.wikipedia.org/wiki/Electric_battery
8. https://www.britannica.com/science Magnetic Circuits
9. https://en.wikipedia.org/wiki/Electromagnetic_induction Electromagnetic Induction

4. Tools: Google Classroom , MKCL ERA LIVE

Mr.J.M.Patil   Mr.S.B.Pawar

(Name & signature of staff)   **(Name & signature of HOD)**

CC: 1. FEE-312310 Course File   2. Lab File   3.Progressive Assessment-D3