

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

**Program and Code:** Electrical Engineering (EE)

**Course Name:** Fundamentals of Electrical Engineering

**Semester:** II      **Scheme:** 'K'    **Allocated Hrs:** 60

**Course Index:** 204

**Course Code:** 312310

**Name of Faculty:** Mr.J.M.Patil

**Class: FYEE-Ohm**

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**• TEACHING-LEARNING & ASSESSMENT SCHEME:**

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme				Credits	Paper Duration	Assessment Scheme								Total Marks		
				Actual Contact Hrs./Week			SLH	NLH		Theory			Based on LL & TL				Based on SL			
				CL	TL	LL				FA-TH		SA-TH	Total	FA-PR		SA-PR				
				Max	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) and Theory Learning Outcomes(TLO): Theory :**
- 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)
<b>CO204.1</b>	CO1	<p><b>Determine various parameters used in electric circuit</b></p> <p>TLO 1.1 Interpret the given electric parameters.</p> <p>TLO 1.2 Explain the given terms of electric circuit.</p> <p>TLO 1.3 Explain the given effect of the electric current</p> <p>TLO 1.4 Calculate work, power and energy for the given circuit.</p>
<b>CO204.2</b>	CO2	<p><b>Use of basic laws of electrical engineering in DC circuits.</b></p> <p>TLO 2.1 Apply Ohm's law to calculate internal resistance of the given circuit.</p> <p>TLO 2.2 Calculate equivalent resistance for the given circuit.</p> <p>TLO 2.3 Categorize the given type of network</p> <p>TLO 2.4 Apply the Kirchhoff's current law and Kirchhoff's voltage law to calculate the electrical quantities in the given circuit.</p>
<b>CO204.3</b>	CO3	<p><b>Use capacitor and battery in electrical circuits</b></p> <p>TLO 3.1 Describe the construction of the given type of capacitor.</p> <p>TLO 3.2 Explain the working of the capacitor in the given circuit.</p> <p>TLO 3.3 Calculate equivalent capacitance in the given D.C. circuit.</p> <p>TLO 3.4 Define Battery and state its types and connections</p> <p>TLO 3.5 Plot charging and discharging curves for the given capacitor and battery.</p>
<b>CO204.4</b>	CO4	<p><b>Use principles of magnetism in Magnetic Circuits.</b></p> <p>TLO 4.1 Interpret the terms related to a magnetic circuit.</p> <p>TLO 4.2 Calculate various parameters of the given magnetic circuit.</p> <p>TLO 4.3 Compare the series and parallel magnetic circuit based on the given criteria.</p> <p>TLO 4.4 Plot B-H curve and hysteresis loop of the given magnetic materials.</p>
<b>CO204.5</b>	CO5	<p><b>Apply Laws of electromagnetism in electrical circuit and systems.</b></p> <p>TLO 5.1 Describe the use of Faraday's laws of electromagnetic induction in the given application.</p> <p>TLO 5.2 Distinguish between the given type of e.m.fs.</p> <p>TLO 5.3 Apply Faraday's laws to calculate induced e.m.f. in the given circuit.</p> <p>TLO 5.4 Calculate self-inductance and energy stored in the magnetic field of the given circuit.</p>

- **Teaching Plan:**

Unit No. (Allotted Hrs.)	Teaching Learning Outcome	Title/Topic Details and Course Outcome (CO)	Plan (From-To & No. of Lectures)	Actual Execution (From-To & No. of Lectures)	Teaching Method/ Media/ Tools	Remark
<b>01. (10)</b>	TLO1.1 TLO1.2	<p><b>Determine various parameters used in electric circuit [CO204.1]</b></p> <p>1.1 Direct Current (DC), Alternating Current (AC)</p> <p>Voltage Source: Ideal and Practical, Current Source: Ideal and Practical</p> <p>1.2 Electric Current, Electric Potential, Potential Difference (PD), Electro-Motive-Force (EMF).</p>	16/12/2025 To 20/12/2025 (04)		PPT, Black Board, YouTube Videos	
	TLO1.4	1.3 Electrical Work, Power and Energy.	23/12/2025 To 24/12/2025 (02)		PPT, Black Board, YouTube Videos	

	TLO1.2	1.4 Resistance, Resistivity, conductivity Effect of Temperature on Resistance 1.5 Types of Resistor and Application	26/12/2025 To 30/12/2025 (03)		PPT, Black Board, YouTube Videos	
	TOL1.3	1.6 Heating Effect, Magnetic effect Chemical effect of Electric current	31/12/2025 To 02/01/2026 (02)		PPT, Black Board, YouTube Videos	
02. (12)	TLO2.1	<b>Use basic laws of electrical engineering in D.C. Circuits [CO204.2]</b> 2.1 Ohm's Law, Internal resistance of source Internal voltage drop, Terminal Voltage	03/01/2026 To 09/01/2026 (04)		PPT, Black Board, YouTube Videos	
	TLO2.2	2.2 Resistance in Series and Resistance in Parallel	10/01/2026 To 16/01/2026 (04)		PPT, Black Board, YouTube Videos	
	TLO2.3	2.3 Active, Passive Circuit, Linear, Non-linear Circuit ,Unilateral and Bi-lateral Circuit, Passive and Active Network, Node, Branch, Loop, Mesh	17/01/2026 To 20/01/2026 (02)		PPT, Black Board, YouTube Videos	
	TLO2.4	2.4 Kirchhoff's Current Law and Kirchhoff's Voltage Law	21/01/2026 To 30/01/2026 (04)		PPT, Black Board, YouTube Videos	
03. (12)	TLO3.1	<b>Use capacitor and battery in electrical circuits [CO204.3]</b> 3.1 Capacitor, Parallel Plate Capacitor.	31/01/2026 to 31/01/2026 (01)		PPT, Black Board, YouTube Videos	
	TLO3.3	3.2 Various connections of capacitor	03/02/2026 to 06/02/2026 (02)		PPT, Black Board, YouTube Videos	
	TLO3.2	3.3 Energy Stored in Capacitor	07/02/2026 to 07/02/2026 (01)		PPT, Black Board, YouTube Videos	
	TLO3.5	3.4 Charging and Discharging of Capacitor, 3.5 Breakdown voltage and Di-electric Strength	10/02/2026 to 13/02/2026 (03)		PPT, Black Board, YouTube Videos	
	TLO3.2	3.6 Types of Capacitor and Application of Capacitor.	14/02/2026 to 14/02/2026 (01)		PPT, Black Board, YouTube Videos	
	TLO3.4	3.7 Types of battery, Construction, series and parallel connection of Battery	17/02/2026 to 18/02/2026 (02)		PPT, Black Board, YouTube Videos	
	TLO3.5	3.8 Charging and Discharging of Capacitor and battery	20/02/2026 to 21/02/2026 (02)		PPT, Black Board, YouTube Videos	
04. (12)	TLO4.1	<b>Use principles of magnetism in Magnetic Circuits (CO204.4)</b> 4.1 Magnetic lines of force, Flux, flux density Magnetic flux intensity, Magneto-Motive-Forces (MMF), Ampere Turns (AT), Reluctance, Permeance, reluctivity.	24/02/2026 to 24/02/2026 (01)		PPT, Black Board, YouTube Videos	

	TLO4.1	4.2 Electric and Magnetic circuit , Series Magnetic Circuit and Parallel Magnetic Circuit	27/02/2026 to 04/03/2026 (04)		PPT, Black Board, YouTube Videos	
	TLO4.3	4.3 Electric and Magnetic circuit: Series Magnetic and Parallel Magnetic Circuit	06/03/2025 to 07/03/2025 (02)		PPT, Black Board, YouTube Videos	
	TLO4.4	4.4 Magnetization Curve (B-H Curve)	10/03/2026 to 10/03/2026 (01)		PPT, Black Board, YouTube Videos	
	TLO4.4	4.5 Magnetic Hysteresis, Hysteresis Loop, Applications.	11/03/2026 to 17/03/2026 (04)		PPT, Black Board, YouTube Videos	
05. (14)	TLO5.1	Apply Laws of electromagnetism in electrical circuit and systems [CO402.5] 5.1 Development of Induced e.m.f. and Current, Faraday's Laws of Electromagnetic Induction.	18/03/2026 to 20/03/2026 (02)		PPT, Black Board, YouTube Videos	
	TLO5.2	5.2 Static and dynamic emf, Lenz's Law Fleming's Right hand rule..	21/03/2026 to 27/03/2026 (04)		PPT, Black Board, YouTube Videos	
	TLO5.3	5.3 Self-Inductance, Coefficient of Self Inductance, Mutual inductance, Coefficient of Mutual inductance (M),Self-induced e.m.f. Mutually induced e.m.f, Coefficient of Coupling.	28/03/2026 to 30/03/2026 (04)		PPT, Black Board, YouTube Videos	
	TLO5.4	5.4 Inductance in series 5.5 Types of inductor Application of inductor, Energy Stored in Magnetic Field..	01/04/2026 to 04/04/2026 (04)		PPT, Black Board, YouTube Videos	
		Total	60			

- **Unit wise CO Mapping:**

	CO204.1	CO204.2	CO204.3	CO204.4	CO204.5
<b>Chapter 1</b>	✓				
<b>Chapter 2</b>	✓	✓			
<b>Chapter 3</b>	✓		✓		
<b>Chapter 4</b>	✓			✓	
<b>Chapter 5</b>	✓				✓

- **Direct Assessment Criteria:**

- **Rules for Theory Assessment:**

1. Unit wise Offline test out of 30 marks will be conducted after completion of each unit.
2. Assignment on each unit will be given to the students after completion of Unit; students have to upload the solved assignment on Google Classroom/submit the same to teacher.
3. Total weightage of Theory Marks to the Course is 100. From 100 Marks 70 Marks are allotted to MSBTE TH Examination and 30 Marks are allotted to Formative Assessment (FR TH) for which Two Class tests of 30 marks each will be conducted during semester as per the guidelines of MSBTE.

- Self-Learning Assessment of 25 Marks is planned to be undertaken by students to facilitate integration of COs, TLOs and LLOs through Micro project/Activities/ Assignments based on Course Outcome requirements.
- End Semester Theory Examination of 70 marks will be conducted by MSBTE at the end of semester. The schedule of MSBTE Examinations will be announced by MSBTE on the website [www.msbte.com](http://www.msbte.com).

• **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 %
<b>Process Related(15 Marks)</b>		<b>60%</b>
1	Effective Practical Implementation with Specified Time	25%
2	Effective Handling of Network Component	25%
3	Follow Ethical Practices	10%
<b>Product Related(10 Marks)</b>		<b>40%</b>
4	Correctness of Practical Implementation	15%
5	Timely Submission OF Practical	15%
6	Answer to Sample Question	10%
<b>Total(25 Marks)</b>		<b>100%</b>

- Final Formative Assessment (FR PR) of 25 marks is calculated based on Progressive Assessment for each experiment.

$$\text{Formative Assessment Marks} = ((\text{Total Marks Obtained in P.A.}) / (25 * \text{Total Number of Experiments})) * 25$$

- 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](https://youtu.be/JMjqizv98bw)
2. [https://youtu.be/j4b\\_fzvG4DY](https://youtu.be/j4b_fzvG4DY)
3. <https://youtu.be/LhkJxkz-NAI>
4. <https://youtu.be/oVuRa4dW7Gg>
5. [https://youtu.be/eVRu8rKQ\\_Mo](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](https://en.wikipedia.org/wiki/Electric_battery)
8. <https://www.britannica.com/science/Magnetic-Circuits>
9. [https://en.wikipedia.org/wiki/Electromagnetic\\_induction](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)

CC: Course File

(Name & signature of HOD)