

<b>Name of Faculty</b>	:	Faculty of Engineering & Technology
<b>Name of Program</b>	:	Diploma Engineering
<b>Course Code</b>	:	2DEE01
<b>Course Title</b>	:	Basics of Electrical Engineering
<b>Type of Course</b>	:	Basic Engineering (BE)
<b>Year of Introduction</b>	:	2023-24

<b>Prerequisite</b>	:	--
<b>Course Objective</b>	:	Electrical engineering is one of the core engineering. Basics of electrical engineering knowledge is required in different occupations. It is therefore necessary for diploma engineering students of almost all the branches to know the basics of electrical engineering concepts. Need of knowledge about fundamental electrical concepts for every branch is considered for this course.
<b>Course Outcomes</b>	:	At the end of this course, students will be able to:
	CO1	To Understand basic terminologies of Electrical circuits & apply fundamental electrical laws to electrical circuits
	CO2	To Understand basic terminologies of magnetic circuits & apply fundamental Magnetic law to magnetic circuits.
	CO3	To Analyze single phase and three phase AC circuits.
	CO4	To understand working and construction of various Electrical machines and transformer.
	CO5	To understand the knowledge of protective devices.

#### Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	SEE	CIA	SEE	CIA	
3	0	2	4	70	30	30	20	150

*Legends: L-Lecture; T-Tutorial/Teacher Guided Theory Practice; P - Practical, C - Credit, SEE - Semester End Examination, CIA - Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.)*

**Course Content**

Unit No.	Topics	Teaching Hours	Weightage	Mapping with COs
1	<b>Fundamentals of Electrical Circuits:</b> Definitions of E.M.F., current, resistance, conductance, Potential Difference, power, energy. Ohm's law, Series-Parallel connection of resistance and capacitance. Energy stored in capacitor and inductor, Current and Voltage Division Rules, Kirchhoff's law.	6	15%	CO1
2	<b>Fundamentals of Magnetic Circuits:</b> Terminology associated with magnetic circuits-MMF, magnetic force, magnetic field strength, permeability, Magnetic flux, flux density, reluctance, leakage factor, etc. Comparison between electric and magnetic circuits. Statically induced e.m.f and dynamically induced e.m.f, Faraday's laws, Lenz's law, Self-inductance and mutual inductance, B-H Curve. Fleming's Left hand rule, Fleming's right hand rule.	6	15%	CO2
3	<b>A.C. Circuits:</b> Definitions of A.C. quantities: Cycle, Frequency, Periodic time, Amplitude, Angular velocity, current, RMS value, Average value, Form Factor & Peak Factor, impedance, phase angle, and power factor. Vector representation of emf and current. Mathematical representation of an alternating emf and current. A.C. through pure a) resistors, b) inductors and c) capacitors. A.C. through R-L series, R-C series, and RLC series & parallel circuit. Power in A. C. Circuits. Concept of power triangle. Voltage and Current relationship in Star and Delta connections.	10	25%	CO3
4	<b>Electrical Machines and Transformer:</b> Working principle, Construction, types and applications of DC generator and motors. Working principle, Construction, types and applications of single phase AC motors. Starting methods for induction motors. Transformer - General construction and principle of transformers. EMF equation and transformation ratio of transformers. List various losses in transformers and equation of efficiency. Applications of Transformers. Construction and uses of auto	10	25%	CO4

	transformers.			
5	<b>Protection and Utilization of Electrical Power:</b> Domestic wiring (a) Lamp Control from one place (b) Staircase Wiring (c) Tube light wiring. Different protective devices such as fuse, MCB and ELCB. Earthing systems: purpose, material used for Earthing, types of Earthing system. Causes of low power factor and advantages of power factor improvement.	10	20%	CO5

#### Suggested Distribution of Theory Marks Using Bloom's Taxonomy

Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	40	20	20	10	0	0

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from above table.

#### Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To measure voltage, current & power in 1-phase circuit. (with resistive load).	2
2	To verify ohm's law.	2
3	Verification of Kirchhoff's laws.	2
4	Analyze the magnetic property. (B-H curve).	2
5	Measure voltage, current, power and power factor in a series RL circuit.	2
6	Measure voltage, current, power and power factor in a series RC circuit.	2
7	Study of DC machine parts & their identification.	2
8	Measurement of transformation ratio K of 1-phase transformer.	2
9	Wiring Diagram of (a) Lamp Control from one place (b) Lamp Control from two places	2
10	Demonstration of MCB & ELCB.	2

#### Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Voltmeter, Ammeter, Multimeter, Watt meter, Frequency meter
2	Auto transformer, battery, DC/AC power supplies, variable resistances, UPS.
3	D.C. Machines, Induction motors.
4	Fuses, MCB, ELCB
5	Transformer

#### Suggested Learning Websites

Sr. No.	Name of Website
1	<a href="http://www.vlabs.co.in">www.vlabs.co.in</a>
2	<a href="http://www.nptel.ac.in">www.nptel.ac.in</a>
3	<a href="http://www.circuitlab.com">www.circuitlab.com</a>
4	<a href="http://www.animations.physics.unsw.edu.au//jw/AC.html">http://www.animations.physics.unsw.edu.au//jw/AC.html</a>

#### Reference Books

Sr. No.	Name of Reference Books
1	B. L. Theraja, "Electrical Technology - Part I and II", S. Chand and Co. 2012
2	D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
3	V.K.Mehta, "Principles of Power System", S.Chand Publication
4	Basic Electrical Engineering - Nagsarkar and Sukhija, Oxford University Press
5	D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.