

<b>Devi Ahilya University, Indore, India Institute of Engineering &amp; Technology</b>			<b>BE - I Year (Common to all branches) Semester- 2</b>				
<b>Subject Code &amp; Name</b>	<b>Instructions Hours per Week</b>			<b>Credits</b>			
<b>EIR2C4: Electrical Engineering</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>Total</b>
<b>Duration of Theory Paper: 3 Hours</b>	<b>3</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>1</b>	<b>1</b>	<b>5</b>

#### **Learning Objectives:**

- To understand the concepts and practical ideas of AC/DC circuits along with basic 3 phase power management, Properties of different magnetic material used in Electromagnetic Circuits to create an idea among students that how different magnetic materials were choose for different practical machines.
- Practical concepts of Transformers and different Electric Machines to make students easy understanding of electrical machines surrounded by us and also they are basic to all the engineering streams.

**Prerequisite(s):** Basic circuit laws and their practical applications.

### **COURSE OF CONTENTS**

#### **UNIT-I**

AC circuits: Generation of EMF, Phasor Quantities, RMS, Average, Form Factor, Peak Factor Etc, Phasor Diagrams; Single Phase AC Circuits: R, L, C And Combinations, Resonance, Q-Factor, Bandwidth; Three Phase AC Circuits: Generation, EMF, Phase Sequence, Analysis of Star and Delta Connections, and Power Measurement In Single Phase& Three Phase Circuit.

#### **UNIT-II**

Circuit analysis tools: Kirchoff's laws, Analysis of DC and AC circuits, Thevenin's theorem, Norton's theorem, Max power transfer theorem, Superposition theorem, and Source transformation .

#### **UNIT-III**

Magnetic Circuits: Electromagnetism, Magnetic flux, Magnetic flux density, Intensity of magnetization, B-H curves, hysteresis and eddy current losses, Magnetic circuit calculations, laws of Electro-magnetic induction, Magnetic induction, Lifting power of an electromagnet.

#### **UNIT-IV**

Transformer: Construction, principle, ideal transformer, EMF equations, Analysis of transformer on no load and load conditions, Equivalent resistance and reactance, voltage regulations, transformer losses Transformer testing, transformer efficiency, Types of transformer, Cooling methods, Auto transformer.

#### **UNIT-V**

Rotating electric Machines: Construction, working principles, EMF equations, Characteristics, Torque equations of DC machines (generators & motors), 3-phase synchronous and induction motor, single phase induction motor.

#### **Learning Outcomes:**

Upon completing the course, students will be able :

- To solve circuit problems based on KVL,KCL laws and different network theorems which helps them to solve practical circuits for future industries exposure .

- The course also covers basic knowledge of alternating circuits and their practical applications, which helps students to understand their domestic home load in better way.
- Students were also able to understand uses of different magnetic materials available in market for constructing different electrical machines and they also able to solve their circuit parameters which helps in designing a electrical machine at initial level.
- After this course, students were able to understand different properties, characteristics and functioning of different parts of transformer and different rotating electrical machines at basic level.

### **BOOKS RECOMMENDED:**

- [1] V Del Toro, Electrical Engineering Fundamentals, 2/e, PHI, 2000.
- [2] D P Kothari, I J Nagrath, Basic Electrical Engineering, 2/e, Tata McGraw Hill, 2002 (Fifth Reprint 2003).
- [3] A Sudhakar, Network Theory, 2/e, Tata McGraw Hill, 2004
- [4] P S Bimbhara, Electrical Machinery, 7/e, Khanna Publishers, New Delhi, 2006.