

**TRAINING TITLE**

**TRANSFORMER TYPES AND BASIC THEORETICAL OPERATIONS**

**Training Duration**

**5 days**

**Training Venue and Dates**

<b>EE359</b>	<b>Transformer Types and Basic Theoretical Operations</b>	<b>5</b>	<b>22-26 Dec 2025</b>	<b>\$5,500</b>	<b>DUBAI, UAE</b>
--------------	---	----------	-----------------------	----------------	-------------------

**In any of the 4 or 5-star hotels. The exact venue will be informed later.**

**Training Fees**

- **\$5,500 per participant for Public Training includes Materials/Handouts, tea/coffee breaks, refreshments & Lunch**

**Training Certificate**

**Define Management Consultancy & Training Certificate of course completion will be issued to all attendees.**

**TRAINING DESCRIPTION**

This course provides a comprehensive introduction to the types, principles, and operation of electrical transformers, focusing on both theory and practical applications. Participants will gain a solid understanding of how transformers work, their components, and how they are used in power generation, distribution, and various industrial applications. The course covers key transformer concepts such as electromagnetic induction, voltage regulation, and load characteristics. By the end of the course, participants will have the knowledge to select, operate, and maintain transformers in real-world scenarios.

**TRAINING OBJECTIVES**

**By the end of this course, participants will be able to:**

- Understand the basic principles of transformer operation and design.
- Learn about different types of transformers and their applications.
- Understand the construction and components of transformers.
- Explore the theoretical concepts of voltage regulation, efficiency, and power losses in transformers.
- Gain practical knowledge on transformer selection and sizing for various applications.
- Learn how to perform basic troubleshooting and maintenance tasks for transformers.
- Understand safety protocols and best practices for working with transformers.

*DMCT/OL/9/18(Rev3Dt:23/9/18)*

## **WHO SHOULD ATTEND?**

- Electrical engineers and technicians involved in the operation and maintenance of transformers.
- Professionals in power generation, transmission, and distribution sectors.
- Students and individuals looking to understand the fundamentals of transformers.
- Anyone working with electrical systems that utilize transformers in industrial, commercial, or residential settings.

## **TRAINING METHODOLOGY**

A highly interactive combination of lectures and discussion sessions will be managed to maximize the amount and quality of information and knowledge transfer. The sessions will start by raising the most relevant questions and motivating everybody to find the right answers. You will also be encouraged to raise your own questions and to share in the development of the right answers using your own analysis and experiences. Tests of multiple-choice type will be made available on daily basis to examine the effectiveness of delivering the course.

Very useful Course Materials will be given.

- 30% Lectures
- 30% Workshops and work presentation
- 20% Group Work& Practical Exercises
- 20% Videos& General Discussions

## **COURSE PROGRAM:**

### **Day 1: Introduction to Transformers and Their Types**

- Overview of transformers: Definition, purpose, and applications in electrical systems.
- Basic transformer principles: Electromagnetic induction, mutual inductance, and Faraday's Law.
- Key transformer components: Core, windings, tap changer, bushings, and tank.
- Types of transformers:
  - Power transformers
  - Distribution transformers
  - Autotransformers
  - Isolation transformers
  - Step-up and step-down transformers

*DMCT/OL/9/18(Rev3Dt:23/9/18)*

- Applications of different transformer types in power systems, industrial plants, and consumer devices.

## **Day 2: Transformer Construction and Operation**

- Transformer core types: Laminated core, solid core, and toroidal core.
- The role of the core in electromagnetic induction and energy transfer.
- Understanding primary and secondary windings: Turns ratio and voltage transformation.
- Basic operation of a transformer: AC voltage input, magnetic flux, and induced voltage.
- The principle of load regulation and how a transformer adjusts to varying load conditions.
- Overview of transformer cooling methods (air, oil, and gas) and their importance.

## **Day 3: Transformer Theory - Voltage, Current, and Power Relationships**

- The relationship between primary and secondary voltage, current, and power (the transformer equation).
- Determining the turns ratio and its effect on voltage and current.
- The concept of transformer efficiency: Power losses, core losses, and copper losses.
- Voltage regulation: How it impacts transformer performance under different loading conditions.
- Calculating transformer efficiency and load factors.
- The importance of impedance matching and voltage adjustment in transformer operations.

## **Day 4: Transformer Testing, Protection, and Maintenance**

- Standard tests for transformers: Open-circuit and short-circuit tests, efficiency, and load tests.
- Understanding transformer insulation and dielectric strength.
- Transformer protection mechanisms: Overcurrent protection, differential protection, and earth fault protection.
- Troubleshooting common transformer faults (e.g., short circuits, winding failures, overheating).
- Preventive maintenance practices: Oil testing, visual inspections, and routine performance checks.

*DMCT/OL/9/18(Rev3Dt:23/9/18)*

- Monitoring transformer health: Using temperature and load monitoring systems.

### Day 5: Practical Applications and Safety Considerations

- Transformer selection criteria: Choosing the right transformer based on voltage, current, and application.
- How to calculate transformer ratings and size transformers for specific uses.
- The role of transformers in electrical power distribution and renewable energy systems (e.g., solar, wind).
- Safety protocols when working with transformers: Lockout/tagout procedures, high-voltage precautions, and personal protective equipment (PPE).
- Key industry standards for transformer design, testing, and operation (IEEE, IEC, ANSI).



**NOTE:**

**Pre-& Post Tests will be conducted.**

**Case Studies, Group Exercises, Group Discussions, Last Day reviews, and assessments will be carried out.**

.....