

# UPS SYSTEMS & BATTERY CHARGERS MAINTENANCE & TROUBLESHOOTING

**ELC028**

## COURSE DESCRIPTION

UPS is a battery-powered electronic device that continues to supply electricity to the load for a certain period of time during a utility failure or when the line voltage varies outside the normal limits. Besides the backup, most UPS also provide surge protection. Modern UPS can either be of the static type or the rotary type.

A sudden loss of power will disrupt most business operations and could lead to a company being unable to trade. Where a company regards electrical power as critical then there will be a need for a continuous or back up power system. Selecting and installing the correct type of battery will enhance and optimize the performance of the UPS. There are however problems with these installations when there is a need for maintenance especially the use of by-pass. Power Quality compatibility problems may cause failure, which was the reason for the original UPS installation.

## COURSE GOAL

To enhance the participants' Knowledge, Skills and abilities necessary to understand the state-of-the-art UPS and battery technologies; to comprehend the types, construction, operations, function of UPS and batteries; and to carry out effective maintenance activities.

## COURSE OBJECTIVES

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

- Design the correct type of UPS system.
- Analyze the characteristics of batteries.
- Understand the role of the stand-by generator.
- Appreciate the functions of the UPS major components.

## WHO SHOULD ATTEND

- Electrical engineers.
- Maintenance technicians.
- Electrical supervisors.
- Engineering professionals.
- Project engineers.

## COURSE DURATION

5 Working Days

## COURSE OUTLINES

### 1. Introduction

- The resilient systems.
- UPS power sources and regulations.
- Critical loads and equipment categories.
- Power quality and mains failure.
- Standby generator set characteristics.
- Generator sizing and compatibility.
- Protection devices and switches.
- UPS or generator.

### 2. Static UPS

- Characteristics of on-line and off-line UPS.
- Double conversion UPS.
- Delta conversion UPS.
- Transformer based and transformerless UPS.
- UPS operation modes.
- UPS components functionality and filters.
- UPS rating and power factor.
- Parallel systems and redundancy.

### 3. Rotary UPS

- Components of diesel rotating UPS or DRUPS.
- Operations of DRUPS.
- Types and configuration of DRUPS.
- Commercial static UPS and operation modes.
- UPS maintenance.
- Generator maintenance.
- Generator size considerations.
- New generation standby generator set.

### 4. Batteries types and chargers

- Lead acid battery characteristics.
- Nickel cadmium battery characteristics.
- Storage and care of batteries.

- Choosing battery size and location.
- Charging methods and type of chargers.
- Battery care.
- Battery safety.
- Battery maintenance.

#### **5. Battery monitoring system and preventive maintenance**

- Merits of battery monitoring system.
- Battery monitoring system architecture.
- Condition monitoring for UPS system.
- UPS safety and hazards.
- Harmonics.

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