



PROJACS ACADEMY
by @egis



Uninterruptible Power Supply (UPS) – Selection, Installation, Maintenance & Operation

مصدر التيار الكهربائي الغير منقطع
الاختيار والتركيب والصيانة والتشغيل

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London / United Kingdom

Introduction

Uninterruptible Power Supply is an integral part for most of the applications that demand the continuity of their electric supply. This Course is intended to provide advanced engineering aspects of Uninterruptible Power Supply (UPS). Emphasis shall be laid on topics relevant to Uninterruptible Power Supplies construction and troubleshooting. Operation, characteristics and selection of Uninterruptible Power Supplies will be studied. Extensive practical examples will be demonstrated through out this course.

Objectives

Upon successful completion of this training program, the participants will learn the following:

- Features of various types of Uninterruptible Power Supplies
- Uninterruptible Power Supplies selection for varies applications
- Uninterruptible Power Supplies construction and Design
- Uninterruptible Power Supplies Operation
- Uninterruptible Power Supplies Maintenance and Installation
- Uninterruptible Power Supplies troubleshooting

Who Should Attend?

The course is targeted to Senior Engineers working in Operation and Maintenance of Uninterruptible Power Supplies.

Course Outline

Day One

UPS Structure

- Rectifier
- Inverter
- Battery
- Static Transfer Switch

UPS Needs and Applications

- Transients
- Harmonics
- Sags
- Swells
- Frequency Disturbances
- Over Voltage
- Under Voltage
- Grounding

UPS Selection

- Emergency Power
- Lighting
- Startup Power
- Transportation
- Mechanical Utility System
- Refrigeration
- Heating
- Production
- Data Processing
- Life Support and Life Safety
- IGBT

Day Two

UPS Types

- Double Conversion
- Single Conversion
- Ferroresonant
- Line-Interactive
- Online ("True")

- Microprocessor – based UPS

UPS Configurations

- Double-conversion systems without bypass
- Group 2: Double-conversion systems with bypass
- Group 3: Single-conversion systems without bypass
- Group 4: Single-conversion systems with bypass

UPS Operation

- Control and Monitoring Software and Hardware
- Self Test
- Waveform output

Solid-State Switches

- Diode
- Thyristor
- Power Transistor
- MOSFET
- IGBT

Day Three

Rectifiers and Chargers

- Uncontrolled Rectifies (Single-Phase and Three-Phase)
- Half-Controlled Rectifiers (Single-Phase and Three-Phase)
- Full-Controlled Rectifies (Single-Phase and Three-Phase)
- Basic Chagrining Methods
 - Constant voltage
 - Constant Current
 - Trickle Charging
 - Pulsed Charge
 - Float Charge
 - Random Charge
- Charging Rates
 - Slow
 - Fast
- Charger Types

Inverter Circuits

- Voltage Source Inverters
- Current Source Inverters
- Inverter Circuit Controller
- Square Wave Controllers
- PWM Controller

- Hystereses Controller

Day Four

Batteries

- Stationary batteries in standby service
- Lead-acid
 - Vented cells (flooded cells)
 - Valve-regulated cells
- Nickel-cadmium
 - Pocket-plate cells
 - Fiber-plate cells
 - Vented Sintered-Plate
- Installation design
- Battery sizing
- Recharge/equalize charging
- State of Charge
- Depth of Discharge
- Storage Capacity, Available Capacity and Total Capacity
- Battery Life
- Battery system short-circuit calculation
- Battery-powered emergency lighting

UPS maintenance

- Preventive Maintenance
- Typical maintenance schedule for a static UPS system

UPS troubleshooting and Testing

- Failure Analysis
- Types of Tests
 - Acceptance Tests
 - Routine Maintenance Tests
 - Special Maintenance Tests
- Types of Testing Methods
- Solid insulation testing
- Insulating liquid testing
- Protective device testing
- Circuit breaker time-travel analysis
- Grounding electrode resistance testing
- Battery Tests
 - Performance Test
 - Cell Removal
 - Water Replacement
 - Use of Hydrometer

- Battery Impedance Test
- Connection Resistance Test
- Indication of Deterioration
- Capacity Tests
- Safety

Day Five

UPS Protection

- Battery charger protection
- Inverter protection
- Static transfer switch protection
- Overvoltage protection
- Equipment physical protection

Reliability of UPS systems

- Applications
- Environmental concerns
- Specification and acceptance testing
- Maintenance and training
- Failure modes
- Management awareness

Training Method

- Pre-assessment
- Live group instruction
- Use of real-world examples, case studies and exercises
- Interactive participation and discussion
- Power point presentation, LCD and flip chart
- Group activities and tests
- Each participant receives a binder containing a copy of the presentation. slides and handouts.
- Post-assessment

Program Support

This program is supported by interactive discussions, role-play, case studies and highlight the techniques available to the participants.

Schedule

The course agenda will be as follows:

- | | |
|---------------------|------------------|
| • Technical Session | 08.30-10.00 am |
| • Coffee Break | 10.00-10.15 am |
| • Technical Session | 10.15-12.15 noon |
| • Coffee Break | 12.15-12.45 pm |
| • Technical Session | 12.45-02.30 pm |
| • Course Ends | 02.30 pm |

Course Fees*

- **5,200 USD**
**VAT is Excluded If Applicable*

المقدمة

يعد مصدر الطاقة غير المنقطع جزءاً لا يتجزأ من معظم التطبيقات التي تتطلب استمرارية إمدادها بالكهرباء. تهدف هذه الدورة إلى توفير الجوانب الهندسية المتقدمة لإمدادات الطاقة غير المنقطعة (UPS).

سيكون التركيز على الموضوعات ذات الصلة بإنشاء إمدادات الطاقة غير المنقطعة واستكشاف الأخطاء وإصلاحها. سيتم دراسة تشغيل وخصائص واختيار إمدادات الطاقة غير المنقطعة. سيتم عرض أمثلة عملية واسعة النطاق من خلال هذه الدورة التدريبية.

الاهداف

سوف يتعلم المشاركون الجوانب التالية عند اكمال البرنامج التدريبي بنجاح:

- العناصر الفنية لمختلف أنواع وحدات مصادر التيار الكهربائي غير المنقطع.
- اختيار وحدات مصدر التيار الكهربائي غير المنقطع المناسبة للتطبيقات المتنوعة.
- تصميم وتصنيع وحدات مصدر التيار الكهربائي غير المنقطع.
- تشغيل وحدات مصدر التيار الكهربائي غير المنقطع.
- تركيب وصيانة وحدات مصدر التيار الكهربائي غير المنقطع.
- كشف الأعطال في وحدات مصدر التيار الكهربائي غير المنقطع.

الحضور

يهدف البرنامج التدريبي لاجتذاب المهندسين من ذوي الاقدمية والأعلى رتبة الذين يتعلق عملهم بتشغيل وصيانة وحدات مصدر التيار الكهربائي غير المنقطع.