

UPS Systems

Overview

This course covers the selection and design of UPS systems for mission critical applications such as hospitals and data centres. The module is primarily focussed on static systems but covers rotary systems briefly

Course Aim

The aim of this course is to give electrical engineers an understanding of the design and operation of the UPS systems and how they are configured with other elements of the electrical power system to provide an uninterruptible supply to critical loads

Learning Objectives:

At the end of the course attendees will have learned

- Fundamental principles of the operation of the UPS systems
- Modes of operation, reliability and redundancy
- The pros and cons of static and rotary systems
- Benefits of modular over block systems
- Battery Systems

Programme

Section 1: Utility Supply Disturbances

- Disturbances and the need for a UPS
- ITIC Curve - ICT tolerances

Section 2: Types of UPS Systems

- Off-line, Line-interactive & On-line
- Transformer based Versus Transformerless UPS
- UPS standards

Section 3: UPS System Components

- Semiconductor Devices used in UPS
- Rectifier, Inverter and Static Bypass

Section 4: Efficiency in Static UPS Systems

- Impact of Load Factor

- The case for Modular UPS
- ECO Mode of operation

Section 5: UPS Configurations and Modes of Operation

- Internal and External bypass
- Modes of Operation
- Multiple UPS systems in Parallel

Section 6: UPS and Power Factor

- Power Factor of IT Loads
- UPS input and Output Power Factor
- Derating UPS for Leading Power Factors

Section 7: UPS Harmonic Distortion

- Triplen, +Ve and –Ve sequence harmonics
- Harmonic Distortion in UPS systems
- Reducing Harmonics in Power Networks

Section 8 - Battery System

- Battery Options - VRSLA, Lion, etc.
- Battery Charging
- Batteries Cabinets and Racks
- Battery Management systems

Section 9 Typical UPS Specification Sheets

- kW/KVA Ratings, Output Characteristics
- Efficiency – From 25% to 100% Load
- Earthing & Fault Clearance in UPS Systems

Section 10 - Rotary UPS Systems

- Motor Generator Systems
- Diesel – DRUPS systems

Section 11: Static UPS & Generator Compatibility Issues

- Overview of Diesel Generator, Capability Curves
- UPS filters and soft start features
- Voltage and frequency control

- Phased transfer of UPS load to generator

Section 12: UPS Testing and Commissioning

- UPS – Commissioning – Levels 1 - 5
- Load bank testing etc.

Who Should Attend

This course will benefit electrical engineers and contractors involved in the supply chain of electrical services for mission critical installations

Duration:

1 day – 7 Hours

Trainer Profile:

Brendan Dervan is a Chartered Engineer with over 40 years' experience in all aspects of mechanical and electrical building services including; design, installation, commissioning and maintenance. After completing an electrical apprenticeship in 1982 he went on to study electrical engineering in DIT. He has worked in M&E consultancy at senior engineer / director level since 1990. In 1999 he started his own M&E consultancy, Dervan Engineering Consultants (DEC), which merged with Cundall in 2016. His Company provided M&E consultancy and project management services to a diverse range of clients in both the public and private sectors. He is owner and director of Best Training since 2019.