

UPS Systems and Battery Operations

This 2 ½ day course covers fundamental components of Power Converters, Inverters, and UPS. It will also cover power conditioning, basic UPS applications, principles of battery operation, power inverters and wave shaping, voltage regulation, static switching and auxiliary

I. Fundamental Concepts of Power Inverters, Converters, and UPS Systems

- Describe the relationship between AC and DC power.
- Discuss the power triangle.
- Discuss the basic operation of a semiconductor device.
- Discuss the different semiconductor devices used in an uninterruptible power supply.
- Describe the various uses of an SCR.
- State the purpose of snubbing when using SCRs.
- Discuss the use of fuses in uninterruptible power supplies.
- Describe the various components/instruments found on a typical UPS system.

II. Power Conditioning

- Describe the different types of noise that affects electronic circuits.
- State the difference between common mode and normal mode noise.
- Describe the major causes of electrical noise.
- Discuss the methods available for protecting equipment against lightning.
- Describe the problems that exist due to

electrostatic discharge and how to deal with them.

- Explain how noise can affect electronic circuits.
- Discuss the different methods of grounding equipment.
- Describe the different types of filters used to protect electronic equipment.

III. Basic UPS Applications

- Describe the purpose of an uninterruptible power supply.
- State the components that make up an uninterruptible power supply.
- Describe the three major categories of inverter systems.
- Discuss a basic block diagram of an uninterruptible power supply.

IV. Principles of Battery Operation

- Explain the basic principles of battery operation.
- State the different types of battery cells.
- Describe the construction and operation of a storage battery.
- Discuss the fundamentals of battery charges.

V. Power Inverters and Waveshaping

- Describe the basic principles of power inverters.
- State the theory of operation of power inverters.
- Discuss types of gate drive circuits.
- Discuss the different types of pulse shaping circuits.
- Describe the operation of a commutation circuit.
- Discuss pulse width modulation.
- Describe the operation of a resonant transformer.
- Describe the operation of a constant voltage transformer.