EPEC Gold Module 1: Delivering Quality Power

Objectives
Upon completion of this module, you will be able to:

- Explain how equality, loss of power, or power surges impact power distribution at industrial facilities.
- Calculate load values.
- Realize the importance of control concepts, switches, starters, and sensors and what they mean to an industrial application.
- Understand motor control center opportunities.
- Identify energy management options on large projects.

Chapter Outline
Chapter One: Power Quality Challenges with Multiple Loads
   A. Load Types and Losses
   B. Harmonics and Total Harmonic Distortion
   C. Solutions to Combat Total Harmonic Distortion and Increase Power Quality

Chapter Two: Controls
   A. Control Concepts: Information, Decision, Action = INPUT, LOGIC, OUTPUT
   B. Electromechanical Limit Switches
   C. Proximity Sensors
   D. Photoelectric Sensors

Chapter Three: Strategies for Startup Problems
   A. Reduced-Voltage Starters
   B. Motor Control Centers

Chapter Four: Energy Management
   A. Controls
   B. Daylighting
   C. Sustainable Building Design
   D. Lighting Management

Chapter Five: Power Distribution Systems: Industrial Products and Considerations
   A. Sources of Power and Distribution Methods
   B. Transformers and Substations in Power Distribution Systems
   C. Low-Voltage Switchboards and Switchgear
   D. Low-Voltage Industrial Circuit Breakers
   E. Low-Voltage Panelboards

Chapter Six: EPEC Assignment
   A. Pricing Switchboards
   B. EPEC Assignment
EPEC Gold Module 2: Controllers, Relays, & Drives

Objectives
Upon completion of this module, you will be able to:

• Explain the difference between NPN and PNP materials and how they are used in diodes, transistors, and thyristors.
• Discuss why it is more efficient and economical to generate and transmit AC power rather than DC power.
• Define the meaning of three-phase rectification.
• Locate the different parts and components on a printed circuit board.
• Discuss how semiconductors can act much like a mechanical switch yet offer many other options.
• List the advantages of solid-state relays and the four designs for control applications.
• Confidently select the correct solid-state relays for each application.
• Gain a thorough understanding of the uses of PLCs.
• Identify the differences between discrete versus analog inputs and outputs.

Chapter Outline
Chapter One: Basics of Solid-State Electronic Control Devices
   A. Semiconductors, Diodes, Rectification, and Amplification
   B. PC Boards
   C. Thermistor
   D. Silicon-Controlled Rectifier
   E. Triac and Diac
   F. Integrated Circuits

Chapter Two: Solid-State Relays
   A. Solid-State Relay Operation
   B. Solid-State Relay Design
   C. Product Selection Considerations

Chapter Three: Basics of Programmable Controllers
   A. PLCs: Introduction
   B. Basic Components of a Programmable Controller
   C. Numbers, Bits, and Bytes
   D. Discrete vs Analog—Inputs and Outputs
   E. The CPU
   F. PLC Scan, Software, Hardware, and Memory

Chapter Four: Variable Frequency Drive Basics
   A. Benefits of Variable Frequency Drives
   B. Load Types for Variable Frequency Drives

Chapter Five: EPEC Assignment
   A. EPEC Electrical System: Controllers, Relays, and Drives
   B. EPEC Assignment
EPEC Gold Module 3: Energy Management

Objectives
Upon completion of this module, you will be able to:

• Discuss international efforts and cooperative agreements regarding climate change and their impact upon the electrical industry.
• Plan for total energy management and help your clients choose the best solutions.
• Recognize the need for careful utility planning.
• Realize the benefits of a heat-of-light system.
• See how utility companies face huge capital requirements due to zonal comfort conditioning benefits in demand-side management.
• Identify how fans can conserve energy and save money.
• Choose products to enhance system energy efficiency.
• Comprehend and suggest the different light controls available for customers.
• Appreciate the link between electrical energy savings and HVAC controls.
• Discuss how motor controls with variable frequency drives enhance energy savings.
• Become familiar with the more advanced remote, multifunction, and computer-based EMCS devices.

Chapter Outline
Chapter One: Energy Savings and HVAC Systems
  A. Heat-of-Light System
  B. Zonal Comfort Conditioning Benefits in Demand-Side Management
  C. Conserving Energy and Saving Money Using Low-Powered Fans
  D. Product Considerations in Energy-Efficient Motors

Chapter Two: Controls
  A. Lighting Controls
  B. HVAC Controls
  C. Motor Controls: Energy Savings with Variable Frequency Drives
  D. Remote, Multifunction, and Computer-Based EMCS

Chapter Three: Sales Strategies for Sustainability
  A. The Energy Management Opportunity
  B. Planning for Total Energy Management
  C. Utility Billing Factors

Chapter Four: EPEC Assignment
  A. EPEC Electrical System: Energy Management
EPEC Gold: Final Exam

This exam presents 100 random questions based on the content presented in Gold Modules 1 through 3. There is no time limit for this exam, and you need to score 75% or higher to pass.

EPEC Gold Capstone: Department Store and Amusement Park