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 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 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 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 Project

Department Store and Amusement Park

Objectives

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

- Review plans and specifications.
- Create a bill of materials for the products selected.
- Determine the best product for each application.
- Develop a cut package of all selected products including related items from the EPEC Triangle.
- Consider product selection variables and trade-offs.

Chapter Outline

A. EPEC Electrical System: Department Store and Amusement Park
B. EPEC Capstone Project