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REFERENCE SYLLABUS

For

Facility Operator Certification Series



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Introduction

This Syllabus is intended to assist candidates studying for the NIULPE Facility Operator Certification Series Examination.

Recommended Study Program:

It is recommended that, before undertaking this examination, the candidate completes Power Engineering Course of study, offered through a recognized and approved technical institute or training provider which addresses the Syllabus Outline.



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Reference Syllabus for Facility Operator Certification Series Examination Candidates

Major Topic: Preparatory Math Topics for Power Engineering

Topic 1 Numerical Unit Systems

Topic 2 Basic Arithmetic Operations

Topic 3 Fractions, Decimals, and Percentages

Topic 4 Ratio and Proportion

Topic 5 Equations and Transposition

Topic 6 Length, Lines, and Simple Plane Figures

Topic 7 Length, Lines, and Simple Plane Figures

Major Topic: Elementary Physical, Chemical, and Thermodynamic Principles

Topic 1 Introduction to Matter and Chemistry

Topic 2 Introduction to Thermodynamics

Topic 3 Introduction to Heat Transfer and Heat Exchangers

Topic 4 Thermodynamics of Steam

Major Topic: Introduction to Power Engineering and its Governance

Topic 1 Introduction to Power Engineering

Topic 2 Jurisdictional Legislation for Power Engineers

Topic 3 Codes and Standards for Power Engineers and Pressure Vessels

Major Topic: Introduction to Plant and Fire Safety

Topic 1 Introduction to Plant Safety

Topic 2 Plant Safety Programs

Topic 3 Handling of Dangerous Materials

Topic 4 Plant Fire Safety

Topic 5 Fire Extinguishing Methods and Equipment

Major Topic: Introduction to Plant Operations and the Environment

Topic 1 Introduction to the Environment

Topic 2 Gas and Noise Emissions

Topic 3 Liquid and Solid Emissions



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Major Topic: Elements of Material Science and Welding Technology

Topic 1 Energy Plant Construction and Operation Materials

Topic 2 Introduction to Welding

Topic 3 Boiler and Pressure Vessel Inspection

Major Topic: Introductory Fluid Handling Technology

Topic 1 Introduction to Energy Plant Piping Systems

Topic 2 Introduction to Energy Plant Valves

Major Topic: Basic Concepts in Electrotechnology

Topic 1 Basic Electricity

Topic 2 Magnetism and Electromagnetism

Topic 3 Electrical Metering Devices

Topic 4 Motors and Generators

Topic 5 Transformers

Topic 6 Electrical Distribution Circuits

Major Topic: Energy Plant Instrumentation and Controls

Topic 1 Introduction to Energy Plant Controls and Instrumentation

Topic 2 Introduction to Process Measurement

Topic 3 Basic Control and Instrumentation Components

Topic 4 Introduction to Programmable Controllers

Topic 5 Electronic Control Systems and Computer Applications

Topic 6 Electrical Control Systems

Major Topic: Fundamental Industrial Communication Skills

Topic 1 Energy Plant Sketching

Topic 2 Plant Diagrams and Drawings

Topic 3 Plant Communications



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Major Topic: **Introduction to Boiler Designs**

Topic 1 Introduction to Boilers

Topic 2 Firetube Boilers

Topic 3 Watertube Boilers

Topic 4 Electric Boilers

Topic 5 Special Boiler Designs for Heating Plants

Topic 6 Differences between Power and Heating Boilers

Major Topic: **Elements of Boiler Systems**

Topic 1 Combustion

Topic 2 Fuel Delivery and Firing Systems

Topic 3 Draft

Topic 4 Feedwater Systems

Topic 5 Blowoff and Blowdown Systems

Topic 6 Boiler Fireside Cleaning Systems

Major Topic: **Lubrication and Bearings**

Topic 1 Lubrication Principles

Topic 2 Types of Bearings and Lubrication

Major Topic: **Pumps and Compressors**

Topic 1 Types of Pumps

Topic 2 Pump Operation and Maintenance

Topic 3 Introduction to Compressors

Topic 4 Compressor Operation and Maintenance

Major Topic: **Boiler Safety Devices**

Topic 1 Pressure Relief Valves

Topic 2 Combustion Safety

Topic 3 Water Level Safety Controls

Topic 4 Boiler Fittings

Topic 5 Firing Rate Controls



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Major Topic: Boiler Plant Operation and Management

Topic 1 Boiler Plant Startup

Topic 2 Boiler Startup

Topic 3 Boiler Operation

Topic 4 Operational Checks

Topic 5 Shutdown Procedures

Topic 6 Boiler Plant Monitoring and Reporting

Major Topic: Energy Plant Maintenance

Topic 1 Energy Plant Maintenance I

Topic 2 Energy Plant Maintenance II

Topic 3 Boiler Maintenance

Topic 4 Boiler Cleaning

Major Topic: Water Treatment

Topic 1 External Boiler Water Treatment

Topic 2 Internal Boiler Water Treatment

Topic 3 Condensate Treatment

Topic 4 Cooling Tower and Condenser Water Treatment

Topic 5 Recirculating System Water Treatment

Major Topic: Types of Prime Movers and Heat Engines

Topic 1 Heat Engines and Prime Movers

Topic 2 Steam Turbines

Topic 3 Condensers and Cooling Towers

Topic 4 Gas Turbines

Topic 5 Internal Combustion Engines

Major Topic: Plant Auxiliary Systems

Topic 1 Lighting Systems

Topic 2 Building Water Systems

Topic 3 Drainage Systems



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Major Topic: Basic Concepts of Compression and Absorption Refrigeration

Topic 1 Refrigeration Basics

Topic 2 Compression Refrigeration Systems

Topic 3 Refrigeration System Control and Operation

Topic 4 Refrigeration System Operation and Maintenance

Topic 5 Absorption Refrigeration Systems

Topic 6 Refrigeration Plant Safety

Major Topic: HVAC Fundamentals for Facility Operators

Topic 1 Conditioning the Air

Topic 2 Humidification

Topic 3 Fans for Air Distribution Systems

Topic 4 Ventilation and Air Filters

Topic 5 HVAC Duct Systems

Topic 6 Types of Coils and Operation

Major Topic: Building Environmental Systems and Control

Topic 1 Steam Heating

Topic 2 Hot Water Heating

Topic 3 Other Heating Systems

Topic 4 Cooling Systems and Combination Systems

Topic 5 Heat Gains and Losses, and Heat Recovery Methods

Topic 6 HVAC Control Strategy

Major Topic: Typical Industrial Plant Configurations

Topic 1 Common Plant Configurations in Hydrocarbon Centric Industries

Topic 2 Common Plant Configurations in Energy Intensive Industries



FACILITY OPERATOR CERTIFICATION SERIES

SYLLABUS

Major Topic: Elementary Mechanics and Dynamics

Topic 1 Introduction to Basic Mechanics

Topic 2 Forces and Moments

Topic 3 Simple Machines

Topic 4 Scalars and Vectors

Topic 5 Linear Velocity and Acceleration

Topic 6 Force, Work, Pressure, Power, and Energy

Topic 7 Friction

Topic 8 Stress and Strain

Topic 9 Power Transmission