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NIULPE, INC.

(NATIONAL INSTITUTE FOR UNIFORM LICENSING OF POWER ENGINEERS, INC.)

REFERENCE SYLLABUS

For

FIFTH CLASS POWER ENGINEER



Introduction

This syllabus has been approved by the NATIONAL INSTITUTE FOR THE UNIFORM LICENSING OF POWER ENGINEERS, INC. (NIULPE)

This Syllabus is intended to assist candidates studying for the Fifth Class Power Engineer Examination.

Recommended Study Program:

It is recommended that, before undertaking this examination, the candidate completes the Fifth Class Power Engineering Course offered through a recognized technical institute or training provider.

In addition to the foregoing course, it is recommended that the candidate becomes familiar with the publications listed in the Reference Material for Power Engineering Students and Examination Candidates, which is obtainable from the various technical institutes or from the NIULPE Website.



REFERENCE SYLLABUS FOR FIFTH CLASS EXAMINATION CANDIDATES

1. Act and Codes

- a) General knowledge of the purpose, content and application of the boiler and pressure vessel codes and regulations.
- b) Introduction to ASME Codes for Power and Heating Boilers

2. Applied Science

- a) Introduction to thermodynamics
- b) Thermodynamics and properties of steam
- c) Thermodynamics and properties of refrigeration

3. Pumps, Piping and Valves

- a) Types of Pumps
- b) Pump components
- c) Pump operation and maintenance
- d) Piping materials and connections
- e) Types and operation of steam traps
- f) Introduction to valves; types and applications

4. Boiler Details

- a) Materials used in construction
- b) Basic boiler terminology
- c) Watertube, tubular, firetube, cast-iron sectional
- d) Electric boilers
- e) High pressure boilers; components, operation, maintenance, repair, inspections, knowledge of power plant auxiliary equipment

5. Boiler Fittings

- a) Basic fittings for steam heating boilers
- b) Operation and testing of boiler safety valves, boiler gauge glass and water column
- c) Basic fittings for hot water boilers

6. Boiler Controls

- a) Low water fuel cutoffs; operation and testing
- b) Heating boiler feedwater controls
- c) Heating boiler operating controls
- d) Heating boiler combustion controls
- e) Boiler programmable controls, safety interlocks

7. Boiler operation, maintenance and water treatment

- a) Hot water heating boilers; start-up, operation and shut-down
- b) Steam heating and power boilers; start-up, operation, shut-down
- c) Testing Safety Devices
- d) Cause and prevention of boiler explosions
- e) Boiler maintenance and preparation for inspection
- f) Replacement of tubes and stays
- g) Boiler cleaning
- h) Boiler lay up
- i) Boiler water treatment basic chemistry, monitoring and testing
- j) Boiler hydrostatic testing and safety precautions



8. Heating Systems and Human Comfort

- a) Steam heating equipment
- b) Steam heating systems and operation
- c) Heating and Ventilating fans and air filters
- d) Electric controls for heating systems

9. Refrigeration and Air conditioning; Systems and Auxiliaries

- a) Compression Refrigeration Systems
- c) Refrigeration compressors
- d) Heat exchangers for refrigeration systems
- e) Cooling towers
- f) Refrigeration system auxiliaries
- g) Elementary air conditioning systems and auxiliaries

10. Air Compression

- a) Types of air compressors
- b) Components of air compressors
- c) Auxiliaries used with air compressors
- d) Operation and maintenance of air compression systems

11. Electricity

- a) Introduction to electricity
- b) Electrical safety, simple circuits, switches and fuses