FIFTH CLASS POWER ENGINEER SYLLABUS - 2012

TECHNICAL SAFETY BC

Safe technical systems. Everywhere.

INTRODUCTION

This syllabus has been approved by the Standardization of Power Engineers Examinations Committee (SOPEEC), the Association of Chief Inspectors (ACI), and has been adopted by Technical Safety BC.

This syllabus is intended to assist applicants studying for their Fifth Class Engineer's certificate of qualification examination.

For more information on Fifth Class Power Engineer certification, visit our website.

CURRICULUM

Applicants should review the SOPEEC curriculum for more detailed information on the materials covered here. Applicants should also become familiar with the publications listed in the reference material posted on the SOPEEC website.

EXAMINATION

A. Administration and Mechanical Drawing

i. Log Books, technical communication and plant diagrams

B. Act and Codes

i. An understanding of the applicable Jurisdictional Legislation and applicable regulations.

ii. Introduction to CSA and ASME Codes for Power and Heating Boilers

C. Applied Science

i. Areas and volumes of solids

ii. Simple machines

iii. Introduction to mechanics

iv. Introduction to thermodynamics

v. Thermodynamics and properties of steam

vi. Thermodynamics and properties of refrigeration

D. Safety

i. Fire safety: classes of fires, types and operation of extinguishers

ii. Building and occupant safety

iii. Confined space entry

iv. Safe storage of flammables

v. WHMIS classification of controlled products

a. Labeling of Controlled Products

b. Material Safety Data Sheets

vi. Personal safety equipment

vii. Occupational health and safety legislation

viii. Housekeeping

ix. Artificial respiration/acceptable methods; CPR; treatment for electric shock

x. Safe work systems

E. Welding and Plumbing

i. Welding terms and inspection

ii. Hot water heaters: operation and maintenance

iii. Building water supply systems: operation, maintenance, safety

iv. Sanitary drainage systems: repair, safety

F. Pumps, Piping and Valves

i. Types of Pumps

ii. Pump components

iii. Pump operation and maintenance

iv. Piping materials and connections

v. Piping: expansion, support, insulation and drains

vi. Types and operation of steam traps

vii. Introduction to valves: types and applications

G. Boiler Details

i. Materials used in construction

ii. Basic boiler terminology

iii. Watertube, tubular, firetube, cast-iron sectional and modular heating boilers

iv. Electric boilers

v. High pressure boilers: components, operation, maintenance, repair, inspections, knowledge of power plant auxiliary equipment

H. Boiler Fittings

i. Basic fittings for steam heating boilers
ii. Operation and testing of boiler safety valve, boiler gauge glass and water column
iii. Basic fittings for hot water boilers

I. Fuels and Combustion

i. Types of fuels, combustion principles, draft and flue gas analysis
ii. Gas burners for boilers
iii. Oil burners for boilers
iv. Draft: natural, induced and forced
v. Boiler and furnace explosions

J. Boiler Controls

i. Low water fuel cutoffs; operation and testing
ii. Heating boiler feedwater controls
iii. Heating boiler operating controls
iv. Heating boiler combustion controls
v. Boiler programmable controls and safety interlocks

K. Boiler operation, maintenance and water treatment

i. Hot water heating boilers: start-up, operation and shut-down
ii. Steam heating and power boilers: start-up, operation, shut-down
iii. Testing safety devices
iv. Cause and prevention of boiler explosions
v. Boiler maintenance and preparation for inspection
vi. Replacement of tubes and stays
vii. Boiler cleaning
viii. Boiler lay up
ix. Boiler water treatment basic chemistry, monitoring and testing
x. Boiler hydrostatic testing and safety precautions

L. Heating Systems and Human Comfort

i. Heat gains and losses
ii. Steam heating equipment
iii. Steam heating systems and operation
iv. Hot water heating systems equipment and operation
v. Steam to hot water convertor
vi. Ventilation fans and air filters
vii. Infrared and electric heating
viii. Humidification
ix. Electric controls for heating systems

M. Refrigeration and Air conditioning; Systems and Auxiliaries

i. Refrigerants; CSA B-52, safety
ii. Compression Refrigeration Systems
iii. Refrigeration compressors
iv. Heat exchangers for refrigeration systems
v. Cooling towers
vi. Refrigeration system auxiliaries
vii. Elementary air conditioning systems and auxiliaries

N. Refrigeration and Air conditioning Controls

i. Refrigeration cycle controls
ii. Compression refrigeration system pre start-up checks
iii. Compression refrigeration system operation and shut-down
iv. Refrigeration system metering devices and capacity controls

O. Air Compression

i. Types of air compressors
ii. Components of air compressors
iii. Auxiliaries used with air compressors
iv. Operation and maintenance of air compression systems
v. Thermoil Systems
vi. Micro-turbine Co-generation

P. Electricity

i. Emergency generators: start-up, operation, shut-down, safety

ii. Introduction to electricity

iii. Lighting systems: incandescent, fluorescent

iv. Electrical safety, simple circuits, switches and fuses