

## GENERAL INFORMATION

### **Introduction:**

This Syllabus is intended to assist candidates studying for the First Class Refrigerator Plants Certificate Examination.

### **Application to Undertake Examination:**

A candidate must submit an application and the prescribed fee at least thirty (30) days before the date of examination as shown on the examination schedule.

### **Examination Instructions:**

The examination consists of two papers, each of 3½ hours duration.

The candidate is allowed to bring the following items into the examination room:

1. A.S.M.E. Codes, except sections VI and VII.
2. The jurisdictional Act and the applicable Regulations.
3. Non-programmable calculator and drawing instruments.
4. C.S.A. B52.

NOTE: The items referenced above are the responsibility of the candidate and must be shown to the examiner for approval.

The examiner will bring a limited supply of:

1. A.S.M.E. Sect. 1
2. C.S.A. B52
3. One dictionary
4. Mathematical Tables and Psychrometric Chart

**The candidate must show picture I.D. at the examination.**

**REFERENCE SYLLABUS FOR REFRIGERATION PLANT OPERATOR - FIRST CLASS**

**EXAMINATION CANDIDATES**

**Part "A"**

**3½ Hours  
Multiple Choice  
Examination**

**A. Applied Mathematics**

- (a) Force of gravity, weight, mass, inertia, accelerating force
- (b) Work, power, energy: potential and kinetic energy, conservation of energy
- (c) Pressure of liquids; density, specific gravity, displacement
- (d) Flow of liquids, pressure head, friction in pipes

**B. Thermodynamics**

- (a) Temperature measuring devices; temperature measuring theory
- (b) Heat and the measurement of heat; temperature scales, units of heat and their relationship, specific heat, sensible and latent heat
- (c) Expansion of liquids and solids, heat transfer, linear, surface and volumetric expansion, conduction, convection and radiation
- (d) Work and heat; mechanical equivalent of heat, laws of thermodynamics
- (e) Expansion and compression of gases; thermal efficiency
- (f) Pressure - Enthalpy diagrams
- (g) Co-efficient of performance
- (h) Psychometric properties of air

**C. Fire Prevention and Plant Safety**

- (a) Plant Safety
  - (1) Plant safety department; safety personnel
  - (2) Types of accidents; causes and prevention
  - (3) Harmful gases, treatment of personnel exposed to harmful gas; gas masks; compressed air or oxygen breathing apparatus; gas detectors
  - (4) General safety equipment; mechanical guards, protective clothing; safety harnesses
  - (5) Lifting gear, cranes; ropes, chains, slings, hooks
  - (6) Electric shock; causes and preventative measures, testing conductors, grounding, treatment of personnel exposed to electric shock
  - (7) Artificial respiration
  
- (b) Fire Protection
  - (1) Classes of fires; selection of fire protective equipment
  - (2) Types of fire fighting equipment, operation and construction
  - (3) Handling and storage of flammable materials
  - (4) Emergency drill; steps taken in the event of fire
  - (5) Fire fighters training for personnel

**Part "B"**

**3½ Hours**

**A. Refrigeration and Air Conditioning**

(a) Refrigeration

- (1) Principles and methods of refrigeration; compression systems, absorption systems; steam jet systems; thermoelectric refrigeration; hermetic cycles; cascade systems; heat pump systems
- (2) Refrigerants; types of properties, classifications, uses
- (3) Refrigerating plants; types, layouts, installation details
- (4) Plant equipment; compressors, condensers, evaporators, liquid receivers, oil separators, absorbers, generators, heat exchangers, rectifiers, driers, scale traps, piping and fittings, cold room construction
- (5) Operation of refrigerating plants; starting up and shutting down, charging, hand and automatic purging, automatic expansion valves, compressor lubrications, brine solutions, leak testing
- (6) Trouble shooting and maintenance; correcting operational troubles, repairing or replacing defective parts, freon cloud and floc points, "copper plating"
- (7) Safety and control; Code requirements, safety fittings, compressor and refrigerant system instrumentation and controls, cooling water system controls
- (8) Computations of capacities and performance of refrigerating plants, ideal and practical refrigerating cycles, theoretical piston displacement and horsepower, heat pumps effect

(b) Air Conditioning

- (1) Terminologies and definitions in psychometrics; psychometric chart and tables, heat transfer, heat load, cooling load
- (2) Heating systems, steam, hot water, high-temperature water, heating systems equipment
- (3) Cooling systems; central, combined heating and cooling systems, chilled water absorption system, cooling system equipment
- (4) Air distribution; air cleaning, humidifying and dehumidifying equipment
- (5) Instrumentation and control of, humidity, air temperature, cooling systems, air-wash systems, outdoor air dampers