NCEES
advancing licensure for engineers and surveyors

NCEES Principles and Practice of Engineering Examination
MECHANICAL—HVAC AND REFRIGERATION CBT Exam Specifications

Effective beginning October 2025

- The exam is computer based. It is closed book with an electronic reference.
- Examinees have 9 hours to complete the exam, which contains 80 questions. The 9-hour time includes a tutorial and an optional scheduled break. Examinees work all questions.
- The exam uses U.S. Customary System (USCS) units.
- Sea level conditions apply unless otherwise noted.
- The exam is developed with questions that require a variety of approaches and methodologies, including design, analysis, and application.
- The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.

	Number of Questions
I. HVAC Loads and Psychrometrics	**18–27**
A. Heating/Cooling Loads	
B. Heating/Cooling Processes (sea level, 5,000-ft elevation, low temperature)	
C. Humidification/Dehumidification Processes (sea level, 5,000-ft elevation, low temperature)	
II. HVAC and Refrigeration Distribution and Systems	**20–30**
A. Air Distribution Systems and Ductwork (e.g., terminal devices, diffusers)	
B. Air Quality and Ventilation (e.g., filtration, dilution, mixing)	
C. Fluid Distribution Systems and Piping (e.g., hydronic, fuel oil, fuel gas, steam/condensate)	
D. Control Concepts (e.g., valves, dampers, sensors, actuators, temperature reset, PID)	
E. Refrigeration and Refrigeration Systems (e.g., processes, food processing and storage, properties, types, ventilation, refrigerants)	
III. HVAC Equipment and Components	**24–36**
A. Cooling Towers and Fluid Coolers	
B. Boilers and Furnaces (e.g., efficiencies, fuel types, combustion)	
C. Heat Exchangers (e.g., shell and tube, plate and frame)	
D. Condensers/Evaporators (e.g., chillers, variable refrigerant flow, heat pumps, thermal storage)	
E. Pumps, Compressors, and Fans (e.g., laws, efficiency, selection, cavitation, curves, NPSH)	

F. Cooling and Heating Coils
G. Energy Recovery (e.g., enthalpy wheels, heat pipes, run-around systems)

IV. Supportive Knowledge (HVAC and Refrigeration) 8–12

A. Codes and Standards
B. Acoustics and Vibration Control (e.g., sound control, absorption, attenuators, noise level criteria, transmission effect, isolation)
C. Economic Analysis
D. Electrical Concepts (e.g., power consumption, motor ratings, heat output, amperage)