NCEES
advancing licensure for engineers and surveyors

NCEES Principles and Practice of Engineering Examination
MECHANICAL—THERMAL AND FLUID SYSTEMS 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 both the International System of units (SI) and the U.S. Customary System (USCS).
- 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. Thermal/Fluid Principles	**19–29**
A. Heat Transfer Principles (e.g., convection, conduction, radiation)	
B. Thermodynamic Principles (e.g., graphical processes, steam tables, Mollier diagrams, psychrometric charts, First and Second Laws)	
C. Fluid Principles (e.g., conservation of energy, conservation of mass, mixing, statics, Moody diagram, Mach number, shock properties, Bernoulli's principle)	
II. Fluid Equipment and Distribution Systems	**17–26**
A. Piping Components and Connections (e.g., valves, fittings, joints, pressure vessels)	
B. Fluid Distribution Systems (e.g., pipe flow, ductwork, friction factor, effective length, pressure drop, controls)	
C. Pumps and Fans (e.g., cavitation, curves, hydraulic power, series, parallel, efficiency, NPSH, potential energy storage)	
D. Compressors, Nozzles, and Diffusers (e.g., efficiency, bleed air, isentropic flow)	
III. Power Systems and Components	**17–26**
A. Turbines (e.g., steam turbine, gas turbine, hydraulic turbine, wind turbine, efficiency, power output)	
B. Boilers, Steam Generators, and Waste Heat Recovery (e.g., heat rate, efficiency, performance)	
C. Condensers (e.g., surface area, materials, duty, performance)	
D. Power Cycles (e.g., Rankine, Brayton, combined cycle, combined heat and power, combustion, internal combustion engines, performance, efficiency)	

	Number of Questions
IV. Cooling/Heating Systems and Components	**12–18**
A. Heat Exchangers (e.g., shell and tube, feed water heaters)	
B. Cooling Towers (e.g., approach, drift, blowdown, makeup-water)	
C. Refrigeration Cycles and Heat Pumps (e.g., vapor compression, absorption, efficiency, cycle components, thermal storage)	
V. Supportive Knowledge (Thermal and Fluid Systems)	**5–8**
A. Economic Analysis (e.g., time value of money, return on investment, break-even point, environmental impact)	
B. Project Planning and Scheduling (e.g., Gantt chart, critical path, resources)	
C. Electrical Concepts (e.g., consumption, motors, current, resistance, voltage)	
D. Material and Stress Analysis (e.g., safety factors, elastic analysis, failure analysis, materials choice, pressure vessels)	
E. Interpretation and Application of Codes and Standards	