

THE NATIONAL COUNCIL OF EXAMINERS FOR ENGINEERING AND SURVEYING

Principles and Practice of Engineering Examination
Mechanical Engineering—BREADTH Examination

EFFECTIVE October 2008

The mechanical engineering examination is a breadth and depth examination. This means that **all** examinees work the breadth (AM) exam and **one** of the three depth (PM) exams. The three areas covered in the mechanical engineering examination are HVAC and Refrigeration; Mechanical Systems and Materials; and Thermal and Fluids Systems. The breadth exam contains questions from these three areas of mechanical engineering. The depth exams focus more closely on a single area of practice in mechanical engineering.

	Approximate Percentage of Examination
Breadth Module (AM)	
I. Basic Engineering Practice	30%
A. Basic Engineering Practice	30%
1. Engineering terms and symbols	
2. Economic analysis	
3. Project management	
4. Interpretation of technical drawings	
5. Electrical concepts	
6. Units and conversions	
II. Mechanical Systems and Materials	20%
A. Principles	13%
1. Statics and dynamics	
2. Strength of materials	
3. Stress analysis	
4. Fatigue theory	
B. Applications	7%
1. Mechanical components (e.g., springs, gears, pressure vessels)	
2. Joints and fasteners (e.g., welding, bolts, adhesives)	
3. Vibration/dynamic analysis	
4. Materials selection (e.g., corrosion, weight, strength)	
III. Hydraulics and Fluids	17%
A. Principles	7%
1. Compressible flow	
2. Incompressible flow	
B. Applications	10%
1. Hydraulic and fluid equipment (e.g., pumps, turbines, compressors)	
2. Piping systems and components	
IV. Energy/Power Systems	15%
A. Principles	7%
1. Thermodynamic cycles	
2. Thermodynamic properties	
3. Energy balances	
4. Mass balances	

5. Heat transfer	
6. Combustion	
B. Applications	8%
1. Power conversion systems	
2. Energy/power equipment (e.g., turbines, boilers, engines)	
3. Heat exchangers	
V. HVAC/Refrigeration	18%
A. Principles	10%
1. Psychrometrics	
2. Refrigeration cycles	
3. Heat transfer	
B. Applications	8%
1. HVAC/refrigeration systems	
2. HVAC/refrigeration components (e.g., air handlers, compressors)	
3. Heating/cooling loads	

Notes

1. The examination is developed with questions that will require a variety of approaches and methodologies including design, analysis, and application. Some questions may require knowledge of engineering economics.
2. Questions in Sections I–IV of this module will be in *either* USCS or SI units. Questions in Section V of this module will be in USCS units.
3. The knowledge areas specified under 1, 2, 3, etc., are examples of kinds of knowledge, but they are not exclusive or exhaustive categories.
4. The breadth (AM) exam contains 40 multiple-choice questions. Examinee works all questions.
5. Score results are combined with depth exam results for final score.