

National Council of Examiners for Engineering and Surveying

Principles and Practice of Engineering ARCHITECTURAL ENGINEERING Exam Specifications Effective Beginning with the April 2010 Examinations

Approximate
Percentage of
Examination
17%

I. Building Systems Integration

- A. Aspects of building performance that affect human comfort (e.g., vibration, noise, lighting, climate control)
- B. Building envelope analysis
- C. Impact of one system on another (e.g., lighting load on air-conditioning system capacity)
- D. Life safety systems (e.g., generators, batteries, exit lighting, fire alarms)
- E. Systems efficiencies (including calculations for energy usage and costs such as life cycle, material)
- F. Sustainability (e.g., energy efficiency, renewable energy, indoor air quality, water conservation)
- G. Applicable standards, codes, and regulations (e.g., NFPA; ASHRAE; ICC; ADA requirements)
- H. Design and construction issues associated with commissioning process, including testing and balancing

II. Electrical Systems

25%

- A. Electrical power systems analysis, including load flow
- B. Short circuit analysis
- C. Grounding principles
- D. Electrical construction methods and materials (new and existing systems)
- E. Overcurrent protection methods and device coordination
- F. Branch circuit and feeder conductor sizing
- G. Power distribution for building systems and equipment
- H. Voltage drop calculations
- I. One-line diagram
- J. Fire alarm device layout
- K. Light source selection considering elements such as type, color, life, cost, efficiency, and application
- L. Lighting calculations (e.g., lumen method, light at a point)
- M. Lighting control
- N. Receptacle layout
- O. Equipment and component selection

III. Mechanical Systems**25%**

- A. Fan laws
- B. Pump laws
- C. Flow and riser diagrams
- D. Static pressure calculations (air and water)
- E. Materials and methods (e.g., new and existing ductwork, piping materials, and insulation)
- F. Piping for specialty systems (e.g., fuel oil, natural gas, medical gas)
- G. Pipe expansion (e.g., expansion joints, loops, anchors)
- H. Heat gain and loss calculations
- I. Psychrometrics
- J. Hydronic and steam systems
- K. Equipment selection (e.g., pumps, air handling units, chillers, boilers)
- L. HVAC system analysis and selection (e.g., air cooled/water cooled, all air, heat pumps, split systems)
- M. Fire protection sprinkler and standpipe classifications
- N. Ventilation
- O. Indoor air quality
- P. Air distribution
- Q. Domestic water systems (routing, sizing)
- R. Stormwater systems
- S. Sanitary waste and vent systems (routing, sizing, slope)
- T. Sequences of operation for building controls

IV. Structural Systems**25%**

- A. Types of construction (e.g., structural steel, timber, concrete, masonry)
- B. Components (e.g., tension, compression, bending, shear)
- C. Structural load effects on overall electrical, mechanical, and structural systems (e.g., seismic, wind, thermal, vibrations)
- D. Connections (e.g., bolted, welded, base plates, brackets)
- E. Loads (e.g., gravity, lateral, temperature, settlement, construction)
- F. Analysis of frames and shear walls
- G. Analysis of construction systems (e.g., new and existing staging, bracing, and loads)
- H. Analysis of stability
- I. Analysis of deflection
- J. Foundations (e.g., piles, shafts, spread)
- K. Materials characteristics (e.g., strength, stiffness, hardness, environmental concerns, fatigue concerns) of steel, concrete, masonry, and timber

- V. Project Management and Construction Administration** **8%**
- A. Discovered site conditions
 - B. Change orders
 - C. Alternates
 - D. Request for information
 - E. Architectural supplemental information (e.g., RFI response, clarification in construction documents, bulletins)
 - F. System conflict resolution
 - G. Scheduling of design tasks, sequence of activities, CPM
 - H. Progress reports
 - I. Quality control
 - J. Contract administration
 - K. Legal issues (e.g., contracts; impact of decisions that may result in lawsuit; errors and omissions)
 - L. Construction safety
 - M. Submittal processes

TOTAL **100%**

Notes

1. The knowledge areas specified as examples of kinds of knowledge are not exclusive or exhaustive categories.
2. This exam contains 80 multiple-choice questions. Examinee works all questions.