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## NCEES Principles and Practice of Engineering Examination
## CIVIL–CONSTRUCTION CBT Exam Specifications

**Effective Beginning April 2024**

- The exam is computer-based. It is closed book with electronic references. The NCEES *PE Civil Reference Handbook* is included in the exam along with the design standards shown on the last page.
- 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 will require a variety of approaches and methodologies, including design, analysis, and application.
- The examples specified in knowledge areas are not exclusive or exhaustive.

| | Number of Questions |
|---|---|
| **1. Soil Mechanics** | **6–9** |
| A. Lateral earth pressure | |
| B. Soil consolidation and settlement | |
| C. Effective and total stresses | |
| D. Bearing capacity | |
| E. Slope stability | |
| **2. Site Layout and Development** | **5–8** |
| A. Layout and control (e.g., staking, benchmarks, elevations) | |
| B. Basic horizontal and vertical curve elements (e.g., middle ordinate, length, chord, radius) | |
| C. Site investigations (e.g., adjacent structures and properties, utilities) | |
| **3. Material Properties** | **5–8** |
| A. Soil, rock and aggregates (e.g., boring log interpretation, classification, strength, permeability, compressibility) | |
| B. Concrete (e.g., mix design, admixtures, proportioning) | |
| C. Steel (e.g., structural, reinforcement, prestressed) | |
| D. Wood (e.g., sawn, engineered) | |
| **4. Estimating Quantities and Costs** | **6–9** |
| A. Quantity take-off methods | |
| B. Cost estimating | |
| C. Engineering economic analysis (e.g., cost analysis for resource selection, break-even, net-present value, life-cycle costing) | |
| D. Work measurement and productivity (e.g., earned value) | |

**5. Project Planning and Scheduling** **7–11**

A. Construction sequencing
B. Activity time analysis
C. Project schedule analysis (e.g., network analysis, critical path method, linear schedules)
D. Resource scheduling and leveling
E. Time–cost trade-off

**6. Material, Production, and Execution Quality Control** **7–11**

A. Material test methods and specification conformance
B. Weld and bolt installation
C. Quality control process (QA/QC)
D. Concrete placement
E. Concrete maturity and early strength evaluation
F. Compaction (e.g., soils, asphalt, aggregates)

**7. Structural Mechanics** **7–11**

A. Loads (e.g., dead, live, construction, wind, preloading)
B. Statics and stresses (e.g., bending, shear, axial, combined, deflection)
C. Structural members (e.g., beams, columns, one-way slabs)
D. Structural systems (e.g., foundations, retaining walls, trusses, frames, two-way slabs, slab-on-grade)

**8. Hydraulics and Hydrology** **4–6**

A. Stormwater collection and drainage (e.g., open-channel flow, culvert, storm sewer, watersheds)
B. Storm characteristics and runoff analysis (e.g., rational and SCS/NRCS methods, types of flow, flow characteristics, hydrographic application, erosion control, runoff time of concentration, storm frequency, rainfall measurement and distribution)
C. Detention/retention ponds

**9. Construction Operations and Methods** **9–14**

A. Lifting and rigging
B. Cranes (e.g., stability, outrigger loads, lifting capacity, crane types)
C. Dewatering and pumping
D. Equipment selection and operations
E. Deep foundation installation
F. Excavation and embankment (e.g., cut and fill analysis, borrow pit volume, haul distances)

**10. Design for Support of Construction Loads** **10–15**

A. Formwork
B. Falsework and scaffolding
C. Shoring and reshoring
D. Bracing and anchorage
E. Support of excavation
F. Construction loads on permanent structures (e.g., erection analysis, equipment loading)

**11. Health and Safety** **4–6**

A. OSHA construction and industry regulations and safety management

B. Work zone and public safety including maintenance of traffic

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## NCEES Principles and Practice of Engineering Examination
## CIVIL–CONSTRUCTION Design Standards

### Effective Beginning with the April 2024 Examination

In addition to the NCEES *PE Civil Reference Handbook*, the following codes and standards will be supplied in the exam as searchable, electronic pdf files with links for easy navigation. This NCEES YouTube video shows how standards will be presented on the exam. Standards will be provided as individual chapters on the exam, and only one chapter at a time can be opened and searched. This ensures the exam software runs large files effectively. The handbook and design standards will be available the entire exam.

Solutions to exam questions that reference a standard of practice are scored based on this list and the revision year shown. Solutions based on other standards will not receive credit.

NCEES does not sell design standards or printed copies of the NCEES handbook. The NCEES handbook is accessible from your MyNCEES account.

| ABBREVIATION | DESIGN STANDARD TITLE |
|---|---|
| **ACI 347R** | *Guide to Formwork for Concrete,* 2014, American Concrete Institute, Farmington Hills, MI, www.concrete.org. |
| **ACI SP-4** | *Formwork for Concrete,* 8th ed., 2014, American Concrete Institute, Farmington Hills, MI, www.concrete.org. |
| **AISC** | *Steel Construction Manual,* 15th ed., 2017, American Institute of Steel Construction, Inc., Chicago, IL, www.aisc.org. |
| **ASCE 37-14** | *Design Loads on Structures During Construction*, 2nd ed., 2015, American Society of Civil Engineers, Reston, VA, www.asce.org. |
| **CMWB** | *Standard Practice for Bracing Masonry Walls Under Construction*, 2012, Council for Masonry Wall Bracing, Mason Contractors Association of America, Lombard, IL, www.masoncontractors.org. |
| **PCA EB001** | *Design and Control of Concrete Mixtures*, 17th ed., 2021, Portland Cement Association, Skokie, IL, www.cement.org. |
| **MUTCD-Pt 6** | *Manual on Uniform Traffic Control Devices for Streets and Highways—Part 6 Temporary Traffic Control,* 2009, including Revisions 1 and 2 dated May 2012, US Department of Transportation, Federal Highway Administration, Washington, DC, www.fhwa.dot.gov. |
| **CFR TITLE 29** | U.S. Department of Labor, Washington, D.C., July 2020. |
| **Part 1903** | Inspections, Citations, and Proposed Penalties |
| **Part 1926** | Safety and Health Regulations for Construction |