NCEES
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Structural Breadth—Vertical Forces (Gravity/Other) and Incidental Lateral Exam Specifications

Effective Beginning April 2027

- The exam is computer-based. It is closed book with electronic references. The NCEES *PE Structural Engineering Reference Handbook* is included in the exam along with the design standards shown on the last page of the specifications.
- Examinees have 6 hours to complete this exam, which contains 55 multiple-choice questions. The 6-hour appointment time includes a tutorial and a scheduled break. The exam will contain scored and unscored (pretest) questions.
- The exam uses the US Customary System (USCS) of units.
- 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.
- The exam contains approximately 20% Bridge questions.
- All questions are equally weighted.
- Questions related to materials and foundations include both design and details.
- Solutions to wood and masonry design questions are based on the Allowable Stress Design (ASD) method.
- Solutions to structural steel and concrete design questions are based on the Strength Design (LRFD) method.

	Number of Questions
1. Generation of Loads	**6–9**

A. Dead
B. Live (e.g., occupancy, roof, pedestrian)
C. Moving (e.g., vehicular, crane)
D. Impact (e.g., vehicular, crane, elevator)
E. Earth pressure
F. Hydrostatic
G. Snow
H. Material deformations (e.g., shrinkage, thermal, prestress shortening)
I. Load combinations

2. Load Distribution and Analysis Methods **7–11**

A. Statics (e.g., determinate and indeterminate, location of forces and moments, free-body diagrams, torsion)
B. Shear and moment diagrams
C. Code coefficients and tables
D. Truss analysis methods (e.g., method of sections/joints, strut and tie)
E. Approximate beam or truss analysis methods
F. Approximate frame analysis methods
G. Influence lines
H. Computer-generated structural analysis techniques (e.g., modeling, interpreting and verifying results)

3. General Structural Considerations **6–9**

A. Material properties and standards
B. Construction administration (e.g., procedures for correcting nonconforming work, testing methods, inspection methods, structural observations)
C. Environmental considerations (e.g., corrosion, frost depth)
D. Serviceability requirements (e.g., deflection, camber, creep, movement joints)
E. Fatigue (e.g., AASHTO, AISC)
F. Coordination
G. Constructability and sequencing
H. Strengthening existing systems

4. Structural Steel **7–11**

A. Flexure (e.g., beams, plate girders, composite beams)
B. Shear
C. Axial (e.g., columns, beam-columns, braces)
D. Bolted connections
E. Welded connections
F. Base plates/bearing plates

5. Concrete **7–11**

A. Flexure (e.g., beams, joists, slabs, bridge decks)
B. Shear (e.g., one-way, two-way, shear friction)
C. Axial (e.g., columns, beam-columns, walls, bridge piers)
D. Prestressed concrete (e.g., bridge girders)

6. Wood **4–6**

A. Flexure
B. Shear
C. Axial (e.g., columns, beam-columns, bearing walls)
D. Connections (e.g., bolted, nailed, screwed)

7. Masonry **4–6**

A. Flexure (e.g., beams, lintels)
B. Shear
C. Axial (e.g., walls, columns, beam-column, pilasters)
D. Connections (e.g., cast-in-place, post-installed)

8. Foundations and Retaining Structures **4–6**

A. Analysis of foundations and retaining structures
B. Retaining walls (e.g., cantilever walls, restrained walls, abutments)
C. Shallow foundations (e.g., spread, combined, mat foundations)
D. Deep foundations (e.g., pile/grade beam, drilled shaft, pile cap)

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Structural Breadth—Vertical Forces Design Standards

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In addition to the NCEES *PE Structural Engineering Reference Handbook*, the following codes and standards will be supplied in the exam as searchable, electronic pdf files with links for easy navigation. 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. All questions use the US Customary System (USCS) of units.

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
AASHTO	*AASHTO LRFD Bridge Design Specifications*, 10th edition, American Association of State Highway & Transportation Officials, Washington, DC.
ACI 318	*Building Code Requirements for Structural Concrete*, 2019 (2022), American Concrete Institute, Farmington Hills, MI.
AISC	*Steel Construction Manual*, 16th edition, American Institute of Steel Construction, Chicago, IL.
ASCE 7	*Minimum Design Loads and Associated Criteria for Buildings and Other Structures*, 2022 edition, American Society of Civil Engineers, Reston, VA.
IBC	*International Building Code*, 2024 edition, International Code Council, Falls Church, VA.
NDS	*National Design Specification for Wood Construction* with *NDS Supplement: Design Values for Wood Construction*, 2024 edition, American Wood Council, Leesburg, VA.
TMS 402/602	*Building Code Requirements and Specification for Masonry Structures*, 2022 edition, The Masonry Society, Longmont, CO.