PS

principles and
practice of surveying
practice exam
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About NCEES
NCEES is a nonprofit organization made up of the U.S. engineering and surveying licensing boards in all 50 states, U.S. territories, and the District of Columbia. We develop and score the exams used for engineering and surveying licensure in the United States. NCEES also promotes professional mobility through its services for licensees and its member boards.

Engineering licensure in the United States is regulated by licensing boards in each state and territory. These boards set and maintain the standards that protect the public they serve. As a result, licensing requirements and procedures vary by jurisdiction, so stay in touch with your board (ncees.org/licensing-boards).

Exam Format
The PS exam contains 100 questions and is administered year-round via computer at approved Pearson VUE test centers. A 7-hour appointment time includes a tutorial, the exam, and a break. You’ll have 6 hours to complete the actual exam.

In addition to traditional multiple-choice questions with one correct answer, the PS exam uses common alternative item types such as:

- Multiple correct options—allows multiple choices to be correct
- Point and click—requires examinees to click on part of a graphic to answer
- Drag and drop—requires examinees to click on and drag items to match, sort, rank, or label
- Fill in the blank—provides a space for examinees to enter a response to the question

To familiarize yourself with the format, style, and navigation of a computer-based exam, view the demo on ncees.org/ExamPrep.

Examinee Guide
The NCEES Examinee Guide is the official guide to policies and procedures for all NCEES exams. During exam registration and again on exam day, examinees must agree to abide by the conditions in the Examinee Guide, which includes the CBT Examinee Rules and Agreement. You can download the Examinee Guide at ncees.org/exams. It is your responsibility to make sure you have the current version.

Scoring and reporting
Exam results for computer-based exams are typically available 7–10 days after you take the exam. You will receive an email notification from NCEES with instructions to view your results in your MyNCEES account. All results are reported as pass or fail.

Updates on exam content and procedures
Visit us at ncees.org/exams for updates on everything exam-related, including specifications, exam-day policies, scoring, and corrections to published exam preparation materials. This is also where you will register for the exam and find additional steps you should follow in your state to be approved for the exam.
EXAM SPECIFICATIONS
PRINCIPLES AND PRACTICE OF SURVEYING
CBT Exam Specifications

Effective beginning January 1, 2019

- The PS exam is computer-based. It is closed book with an electronic reference.
- Examinees have 7 hours to complete the exam, which contains 100 questions. The 7-hour time also includes a tutorial and an optional scheduled break.
- The exam uses the U.S. Customary System (USCS) of units.
- The exam is developed with questions that will require a variety of approaches and methodologies, including design, analysis, and application.

1. **Legal Principles**
   A. Principles of Evidence
      1. How to search for data and for physical evidence to evaluate data
      2. How to evaluate data
      3. Parol evidence
      4. Prescriptive rights
      5. Adverse possession
      6. Acquiescence
      7. Controlling elements
      8. Easement rights
   B. Common Law Boundary Principles
      1. Historical and current common law principles
      2. Riparian and littoral rights
      3. Sovereign rights, including both navigable waters and eminent domain
      4. Sovereign land grants
   C. Sequential and Simultaneous Conveyance Concepts
      1. Types of conveyances
      2. Junior/senior rights
      3. Record and physical evidence
   D. Legal Descriptions for Real Property Transactions
      1. Preparation and interpretation of legal descriptions
      2. Controlling elements and how they impact the description
      3. Unwritten rights and how they impact the description
      4. Encumbrances and how they impact the description
      5. Easements and how they impact the description
   E. Evidence for the Perpetuation of the U.S. PLSS
2. Professional Survey Practices

A. Public/Private Record Sources
   1. Resources for private and public records
   2. Local public records indexing and filing system
   3. Local survey office records

B. Documentation, Supervision, and Clear Communication of Field Procedures
   1. Field surveying techniques
   2. Field surveying practices
   3. Data collection protocols

C. GPS/GNSS including satellite constellations, static GPS, RTK, PPP, and virtual networks

D. Surveying Principles and Computations
   1. Technical computations
   2. Applicable software

E. Monumentation Standards
   1. Applicable monumentation criteria
   2. Monument types

F. Land Development Solutions
   1. Regulatory land development criteria
   2. Construction criteria
   3. Land development implementation procedures

G. Survey Maps/Plats/Reports
   1. Technical communications by schematic, platting, and mapping processes and procedures
   2. Communication options

H. GIS
   1. GIS spatial databases and metadata
   2. Datums and projections related to GIS

3. Standards and Specifications

A. BLM Manual of Surveying Instructions
B. ALTA/NSPS Land Title Survey Standards
   1. Current ALTA/NSPS Land Title Survey Standards
   2. State statutes regarding boundary surveys in conjunction with ALTA/NSPS Land Title Surveys

C. FEMA Requirements
   1. FEMA specifications and instructions
   2. Horizontal and vertical datums related to FEMA flood zones
   3. Current FEMA elevation certificate
   4. FEMA Flood Insurance Study
4. Business Practices
   A. General Business Practices and Procedures
      1. Project planning and project management
      2. Deliverables
      3. Costs, budgets, and contracts
      4. Types of surveys
      5. Site features and conditions
      6. Scope of services
      7. Appropriate equipment and instruments
   B. Risk Management Procedures
      1. Safety procedures
      2. QA/QC methods
      3. Risk management in contracts
      4. Insurance needs and requirements
      5. Potential liabilities
   C. Professional Conduct
   D. Communication with Clients, Staff, Related Professions, and the Public
      1. Different forms of communications
      2. Appropriate type of communication to convey concepts
      3. Related professions and their impact on client needs and deliverables

5. Areas of Practice
   A. ALTA/NSPS Land Title Surveys
      1. Legal documents, such as deeds, easements, and agreements
      2. Zoning information as applied to ALTA/NSPS Land Title Surveys
      3. Title insurance commitment letters and policies
      4. Underground features as applied to ALTA/NSPS Land Title Surveys
   B. Control Networks and Geodetic Network Surveys
      1. Datums and reference frames relative to control networks
      2. Differences between local datums and geodetic datums
      3. Equipment appropriate for control surveys
      4. The Federal Geographic Data Committee Geospatial Positioning Accuracy Standards
      5. The National Geospatial Programs (NGP) Standards and Specifications—Digital Data Standards
   C. Construction Surveys
      1. Construction plan reading
      2. Construction calculations including slopes, grades, and plan details
      3. Construction techniques and activities
      4. Horizontal and vertical positioning relative to a plan or datum
   D. Boundary Surveys
      1. Physical boundary evidence
      2. Boundary reconciliations
      3. Historical measurement accuracy, equipment, and techniques
      4. Legal principles related to boundary surveys
E. Route Surveys for Alignments and Utilities
   1. Route alignment stationing practices
   2. Reading and interpreting roadway and utility plans

F. Topographic
   1. Topographic/planimetric mapping and control standards
   2. Interpretation, reconciliation, and adjustment of topographic survey data
   3. QA/QC procedures as applied to topographic surveys
   4. Ground, hydrographic, and remote sensing equipment
   5. The U.S. National Map Accuracy Standards as applied to topographic surveys
   6. Tools and techniques required to perform hydrographic, bathymetric, and remote sensing surveys
   7. Nomenclature related to utilities

G. Surveys to Establish New Parcels, Lots, or Units
   1. Types of subdivisions
   2. Platting
   3. Condominiums and associations
   4. Deed restrictions and restrictive covenants
   5. Zoning and subdivision ordinances

H. As-Built/Record Drawing Surveys
   1. As-built/record drawing calculations including slopes, grades, and plan details
   2. As-built/record drawing techniques and activities
   3. Horizontal and vertical as-built/record drawing positions relative to a plan or datum

I. Consultation Services
   1. Site topography and slope for development purposes
   2. Site access for development purposes
   3. Zoning standards related to new projects
   4. Floodplains as related to land development
1. The owner of a large tract of land sold several lots over a period of many years. The surveying work was done by different surveyors. The owners of the separate lots have quarreled continually over the location of their property lines. You have been engaged to help resolve the difficulties and have plotted the map shown below from the legal descriptions and plats called for in their deeds. The original owner claims to have retained the NW quarter of the original plot.

Your office decides to prepare a perpetual map file showing probable resolutions to location conflicts. Based on the controlling standards of surveying, identify a resolution to this conflict in the plat diagram below. To do so, circle the line that represents the proper resolution to the overlap conflict between Lots A and D.

**LEGEND**

- △ Accepted corners of original tract
- ○ Monument set by surveyor who "cut out" Lot A as shown on a plat dated January 7, 1931
- ---○ Monument set by surveyor who "cut out" Lot C as shown on a plat dated June 10, 1936
- ---● Monument set by surveyor who "cut out" Lot D as shown on a plat dated December 9, 1945
- ——— Lot B as described in a deed dated April 27, 1933
- ———— Tract claimed by original owner
7. You are asked to survey a property whose description runs to the thalweg of a river. You determine the thalweg at the:

- A. high waterline on the bank of the river at the 100-year flood level
- B. midpoint of the river by splitting the high waterlines
- C. deepest part of the channel as determined by measured depth or sounding
- D. deepest single center point of the channel proportioned between existing bank lines

8. Eminent domain can be used for which of the following circumstances?

Select all that apply.

- A. Easement for access of Private Owner A across Private Owner B's land
- B. Expanding Owner A's existing appurtenant easement across Owner B's land in order to build a public road for new subdivided lots
- C. Land for a new runway identified in the municipal airport's master plan
- D. Land for the extension of an existing runway not identified in the municipal airport's master plan
- E. Land development financed by a publicly guaranteed loan
- F. Road widening to accommodate future traffic loads
- G. Compelling the public use of water from a community association's well

9. In legal descriptions, certain terms are often used interchangeably although they are not strictly synonymous. If a given easement is intended to touch upon and maintain constant and continuous contact along a certain line, the term that is most likely to ensure the proper conveyance of this meaning is:

- A. coincident with
- B. adjacent to
- C. adjoining
- D. contiguous with
22. You establish the correct title line between Lots 7 and 8. This title line falls 3 ft west of an old fence. The two adjoining owners always thought that the old fence was their boundary line. While you are performing the survey, they once again orally agree and tell you that, regardless of your survey, they are going to mutually observe the fence line as their boundary line. In order to best preserve the evidence discovered by your survey, it would be best to show:

- A. only the surveyed title line on your plat of survey
- B. the fence line and the title line on your plat of survey, and record the plat in the public records
- C. the fence line and the title line on your plat of survey, and add a surveyor's note concerning the adjoiners' agreement and record the plat in the public records
- D. the fence line and the title line on your plat of survey, and add a surveyor's note concerning the adjoiners' agreement

23. Under a state plane coordinate system, grid azimuth would equal geodetic azimuth at a survey station located:

- A. along an agonic line
- B. on the central meridian of the zone
- C. along any principal meridian of the U.S. Rectangular Survey System
- D. on one of the lines of intersection of the developable surface with the sea level surface of the earth

24. According to the *Manual of Surveying Instructions*, current edition, standard parallels (correction lines) are extended east and west from the principal meridian at intervals north and south of the baseline. The interval (miles) at which the parallels are extended is usually _____________.

Enter your response in the blank.
30. Match the quality management titles below to their corresponding group of activities/tasks.

Activities/Tasks

<table>
<thead>
<tr>
<th>Quality Assurance</th>
<th>Quality Control</th>
<th>Quality Planning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Set priorities: scope, time, cost</td>
<td>Continually improve process activities: perform process analysis, remove nonvalue activities, etc.</td>
<td>Inspection and verification: perform inspections of the work</td>
</tr>
<tr>
<td>Create scope statement</td>
<td>Initiate activities to prevent problems before they occur</td>
<td>Ensure the product is of acceptable quality according to scope and success criteria</td>
</tr>
<tr>
<td>Set criteria for success</td>
<td>Establish a quality baseline</td>
<td></td>
</tr>
</tbody>
</table>

31. Your firm has professional liability (errors and omissions) insurance, but the court found your firm **not** liable for a surveying error. The firm is now free from:

- A. any cost arising out of the litigation
- B. any cost arising out of the litigation except the deductible
- C. any cost arising out of the litigation except the deductible and the legal fees
- D. any cost arising out of the litigation except that portion of the deductible needed for legal fees
1. Lot A, created in 1931, has seniority over Lot D, which was created in 1945. The grantor of Lot D cannot convey land that has already been conveyed to another.

THE CORRECT ANSWER IS SHADIED ABOVE.

2. See Reference:


THE CORRECT ANSWER IS: D

3. See Reference:


THE CORRECT ANSWER IS: A

4. The deed does not call for a line 100 ft from and parallel with Sky Road. The call for acreage is not controlling in this description. Acreage is of low order of importance. The bearings and distance along Rains Road and along the Gull line are the most certain calls.

THE CORRECT ANSWER IS: C

5. See Reference:


THE CORRECT ANSWER IS: B
6. See Reference:


**THE CORRECT ANSWER IS: D**

7. See Reference:


**THE CORRECT ANSWER IS: C**

8. See Reference:


**THE CORRECT ANSWERS ARE: C, D, AND F**

9. See Reference:


**THE CORRECT ANSWER IS: A**

10. See Reference:


**THE CORRECT ANSWER IS: B**

11. It is generally accepted professional practice to request that a corrected deed be filed.

**THE CORRECT ANSWER IS: A**
19. Astronomic observations, gravity determinations, and the curvature of the earth are factors that are accounted for by geodetic surveying.

**THE CORRECT ANSWERS ARE: A, B, AND D**

20. See Reference:


**THE CORRECT ANSWERS ARE: A, B, AND E**

21. Items 2, 3, and 5 represent sound project planning practices.

**THE CORRECT ANSWER IS: C**

22. The title line must be shown since the agreement may be binding between present parties only. The fence line should be shown to illustrate possession. Noting the agreement and recording the plat puts others on notice of both locations and the agreement.

**THE CORRECT ANSWER IS: C**

23. In the state plane coordinate system the central meridian of a zone is aligned with geodetic north.

**THE CORRECT ANSWER IS: B**

24. See Reference:


"Standard Parallels, 3-13. Standard parallels, which have also been called correction lines, are extended east and west from the principal meridian, at intervals of 24 miles north and south of the base line, in the manner prescribed for the survey of the base line."

**THE CORRECT ANSWER IS: 24**
30. These are generally accepted definitions for standard terms in quality management.

### Activities/Tasks

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**THE CORRECT TITLES ARE SHOWN ABOVE.**

31. This is standard practice in the insurance industry.

**THE CORRECT ANSWER IS: D**

32. This is standard practice for expert witness testimony.

**THE CORRECT ANSWER IS: D**

33. This is standard practice for expert witness testimony.

**THE CORRECT ANSWER IS: D**

34. It is considered sound client relations practice to contact the employer and explain the options available.

**THE CORRECT ANSWER IS: A**

35. Standard professional practice dictates that you show on your plat both the dimensions of the plat/deed of the adjoining tract and your own measurements.

**THE CORRECT ANSWER IS: D**