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About NCEES
The National Council of Examiners for Engineering and Surveying (NCEES) is a nonprofit organization made up of engineering and surveying licensing boards from all U.S. states and territories. Since its founding in 1920, NCEES has been committed to advancing licensure for engineers and surveyors in order to protect the health, safety, and welfare of the American public.

NCEES helps its member licensing boards carry out their duties to regulate the professions of engineering and surveying. It develops best-practice models for state licensure laws and regulations and promotes uniformity among the states. It develops and administers the exams used for engineering and surveying licensure throughout the country. It also provides services to help licensed engineers and surveyors practice their professions in other U.S. states and territories.

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-day schedule
Be sure to arrive at the exam site on time. Late-arriving examinees will not be allowed into the exam room once the proctor has begun to read the exam script. The report time for the exam will be printed on your Exam Authorization. Normally, you will be given 1 hour between morning and afternoon sessions.

Admission to the exam site
To be admitted to the exam, you must bring two items: (1) your Exam Authorization and (2) a current, signed, government-issued identification.

Examinee Guide
The NCEES Examinee Guide is the official guide to policies and procedures for all NCEES exams. All examinees are required to read this document before starting the exam registration process. You can download it at ncees.org/exams. It is your responsibility to make sure that you have the current version.

NCEES exams are administered in either a computer-based format or a pencil-and-paper format. Each method of administration has specific rules. This guide describes the rules for each exam format. Refer to the appropriate section for your exam.

Scoring and reporting
NCEES typically releases exam results to its member licensing boards 8–10 weeks after the exam. Depending on your state, you will be notified of your exam result online through your MyNCEES account or via postal mail from your state licensing board. Detailed information on the scoring process can be found at ncees.org/exams.

Staying connected
To keep up to date with NCEES announcements, events, and activities, connect with us on your preferred social media network.
101. A 227-ft length of canal is to be lined with concrete for erosion control. With 12% allowance for waste and overexcavation, the volume (yd^3) of concrete that must be delivered is most nearly:

(A) 234  
(B) 280  
(C) 292  
(D) 327

102. Based on the straight-line method of depreciation, the book value at the end of the 8th year for a track loader having an initial cost of $75,000, and a salvage value of $10,000 at the end of its expected life of 10 years is most nearly:

(A) $10,000  
(B) $15,000  
(C) $23,000  
(D) $48,750

103. The budgeted labor amount for an excavation task is $4,000. The hourly labor cost is $50 per worker, and the workday is 8 hours. Two workers are assigned to excavate the material. The time (days) available for the workers to complete this task is most nearly:

(A) 3  
(B) 4  
(C) 5  
(D) 12.5
104. A CPM arrow diagram is shown below. Nine activities have been estimated with durations ranging from 5 to 35 days. The minimum time (days) required to finish the project is most nearly:

(A) 40  
(B) 42  
(C) 45  
(D) 50

105. A bridge is to be jacked up to replace its bearings. The design requires a hydraulic ram with a minimum capacity of 1,000 kN (kilonewtons). The hydraulic rams that are available are rated in tons (2,000 lb/ton). The minimum size (tons) ram to use is most nearly:

(A) 1,110  
(B) 250  
(C) 150  
(D) 100
501. The load-settlement behavior of an in situ soil deposit will be determined from laboratory oedometer testing. The soil sampling technique specimen that will provide the most reliable load-deformation characteristics is a soil sample obtained from:

(A) a thin-walled pushed sampler (Shelby tube)
(B) a Standard Penetration Test sampler (SPT or split-spoon sampler)
(C) trimmings from a hand auger
(D) trimmings extracted from the outside of an auger

502. Borings performed on a site indicate the subsurface profile consists of about 30 ft of silty gravel underlain by an interbedded claystone/sandstone bedrock. Which of the following exploration techniques is the best choice to provide an estimated shear wave velocity for the soil and rock profile?

(A) Pressure meter
(B) Seismic refraction
(C) Ground penetrating radar
(D) Electrical resistivity

503. During a Standard Penetration Test (SPT), unusually low blow counts are encountered in a soil expected to be medium-dense to dense sand. This is an indication that the following condition is most likely present:

(A) The sampler drive shoe is badly damaged or worn due to too many drivings to refusal.
(B) Cobbles are encountered.
(C) The sampler drive shoe is plugged.
(D) The groundwater in the borehole is much lower than in situ conditions immediately outside the bore hole.
504. **Figure 1** shows a gradation curve for a soil. Using **Figure 2**, you determine the best USDA textural classification of this soil is:

(A) loam
(B) loamy sand
(C) silt
(D) silty loam

Horizontal length of side slope = \(14 \times \frac{3}{2} = 21.0\) ft

Slope length = \(\sqrt{(14)^2 + (21)^2} = 25.24\) ft

Cross-sectional area of lining = \([(2 \times 25.24) + 9] \frac{7}{12} = 34.70\) ft\(^2\)

Volume of lining = \(\frac{(34.70 \times 227)}{27} = 291.7\) yd\(^3\)

Delivered volume = \(291.7\) yd\(^3\) \times 1.12 = 327 yd\(^3\)

THE CORRECT ANSWER IS: (D)


\[
D = \frac{75,000 - 10,000}{10}
\]

\[
D = $6,500
\]

Book value after 8 years = \(75,000 - (8)(6,500) = 23,000\)

THE CORRECT ANSWER IS: (C)


Crew cost = \(2(50/\text{hr}) = 100/\text{hr}\)

Days allowed = \(\frac{4,000}{(8 \text{ hr/day})(100/\text{hr})} = 5\) days

THE CORRECT ANSWER IS: (C)


Activities: \(7 + 4 + 5\)

Days: \(30 + 10 + 10 = 50\) days

THE CORRECT ANSWER IS: (D)

\[
1,000 \text{ kN} = 1,000 \text{ kN} \times \frac{1 \text{ ton}}{8.896444 \text{ kN}} = 112.4 \text{ tons}
\]

150 tons > 112.4 tons

**THE CORRECT ANSWER IS: (C)**


\[
\tan(x) = \frac{40}{30} \quad x = 53.13^\circ
\]

\[
\cos(53.13^\circ) \times 100 \text{ ft} = 60 \text{ ft}
\]

60 ft – 35 ft = 25 ft

**THE CORRECT ANSWER IS: (B)**


\[
\sum M_a = 0
\]

\[
\sum M_a = (160 \text{ lb/ft})(16 \text{ ft})(16 \text{ ft}/2) - 10 \text{ ft} (R_x) = 0
\]

\[
R_x = 2,048 \text{ lb}
\]

Axial load in brace = \(\frac{(2,048)\sqrt{2}}{1} = 2,896 \text{ lb}\)

**THE CORRECT ANSWER IS: (C)**

The determination of the load-settlement behavior of an in situ soil deposit is most reliably evaluated by oedometer testing using a soil specimen retrieved with the most minimal disturbance possible. Of the choices given, the least disturbance occurs using a thin-walled pushed sampler.

**THE CORRECT ANSWER IS: (A)**


Seismic refraction is the best method as it yields the P and S waves for the soil and rock profiles and can be used to evaluate the upper 100 ft of the soil and rock.

**THE CORRECT ANSWER IS: (B)**


Groundwater coming up into the casing or hollow-stem augers can cause the test zone to become "quick." This loosening will reduce the strength of the soil. The other three conditions typically cause an increase in SPT N-values.

**THE CORRECT ANSWER IS: (D)**

504. The material percentages are:

<table>
<thead>
<tr>
<th>Material</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravel</td>
<td>2%</td>
</tr>
<tr>
<td>Sand</td>
<td>80%</td>
</tr>
<tr>
<td>Silt</td>
<td>17%</td>
</tr>
<tr>
<td>Clay</td>
<td>1%</td>
</tr>
</tbody>
</table>

Using the USDA chart in Figure 2, loamy sand is the correct answer.

**THE CORRECT ANSWER IS: (B)**

505. Attempted length = 175 – 160 = 15 ft
Length of core ignoring pieces < 4 in. = 12 ft
RQD = 12/15 = 80%

**THE CORRECT ANSWER IS: (D)**