

Boost up Your Certification Score

NCEES

PE-Civil-Geotechnical

1224 PE Civil Geotechnical



For More Information – Visit link below:

<https://www.examsboost.com/>

Product Version

- ✓ **Up to Date products, reliable and verified.**
- ✓ **Questions and Answers in PDF Format.**

Visit us at: <https://www.examsboost.com/test/pe-civil-geotechnical>

Latest Version: 6.0

Question: 1

A geotechnical engineer is conducting a groundwater exploration program using a combination of piezometers and observation wells. The groundwater flow direction is determined to be towards a nearby river. If the hydraulic gradient is measured at 0.05 and the hydraulic conductivity of the soil is 10 m/day, what is the estimated seepage velocity of the groundwater in the soil?

- A. 0.5 m/day
- B. 2 m/day
- C. 5 m/day
- D. 10 m/day

Answer: A

Explanation:

The seepage velocity (v) can be calculated using

Darcy's law: $v = K \cdot i$, where K is the hydraulic conductivity and i is the hydraulic gradient. Thus, $v = 10 \text{ m/day} \cdot 0.05 = 0.5 \text{ m/day}$.

Question: 2

During a site investigation, a soil sample is retrieved from a depth of 10 m below ground level. The soil is classified as silty sand (SM) based on the Unified Soil Classification System (USCS). If the sample has a moisture content of 12%, what is the specific gravity of the solids if the dry density of the soil is 18 kN/m³?

- A. 1.65
- B. 1.70
- C. 1.75
- D. 1.80

Answer: D

Explanation:

The specific gravity (G) can be calculated using

the formula $G = \frac{\gamma_d}{\gamma_w}$, where γ_d is the dry density, and γ_w is the unit weight of water (approximately 9.81 kN/m^3). Thus, $G = \frac{18 \text{ kN/m}^3}{9.81 \text{ kN/m}^3} \approx 1.83$.

Question: 3

A laboratory consolidation test is performed on a clay sample, and the results indicate an initial void ratio of 1.2. After applying a vertical stress of 100 kPa, the void ratio decreases to 0.9. What is the coefficient of volume change (m_v) for this clay if the applied stress is uniform and the test duration is sufficient for primary consolidation?

- A. 0.003
- B. 0.02
- C. 0.03
- D. 0.05

Answer: A

Explanation:

The coefficient of volume change can be

calculated using the formula $m_v = \frac{e_0 - e}{\Delta\sigma}$, where e_0 is the initial void ratio, e is the final void ratio, and $\Delta\sigma$ is the change in stress. Thus, $m_v = \frac{1.2 - 0.9}{100} = 0.003$.

Question: 4

A site has been found to have contaminated soil containing heavy metals. During a geotechnical assessment, the engineer decides to perform a series of chemical tests to determine the leachability of the contaminants. Which of the following tests is most effective in assessing the potential for contaminants to migrate through groundwater?

- A. pH test
- B. Toxicity Characteristic Leaching Procedure (TCLP)
- C. Standard Proctor Test
- D. Atterberg Limits Test

Answer: B

Explanation:

The Toxicity Characteristic Leaching Procedure (TCLP) is designed specifically to evaluate the leachability of contaminants from soil into groundwater, making it the most relevant test for this scenario.

Question: 5

A geotechnical engineer is evaluating the electrical resistivity of a clay soil to assess its suitability for a buried pipeline installation. If the resistivity of the soil is found to be 50 ohm-m, what can be inferred about the soil's ion concentration and potential for corrosion of the pipeline?

- A. High ion concentration, low corrosion potential
- B. Low ion concentration, high corrosion potential
- C. High ion concentration, high corrosion potential
- D. Low ion concentration, low corrosion potential

Answer: C

Explanation:

A low electrical resistivity value (50 ohm-m) indicates a high concentration of ions in the soil, which can lead to increased corrosion potential for buried pipelines.

Question: 6

In a thermal conductivity test on a saturated sand sample, the thermal conductivity is measured at 1.5 W/m•K. If the temperature gradient across the sample is 10 K over a thickness of 0.5 m, what is the heat flux through the sample?

- A. 10 W/m²
- B. 15 W/m²
- C. 20 W/m²
- D. 30 W/m²

Answer: D

Explanation:

The heat flux (q) can be calculated using Fourier's

law: $q = k \cdot \frac{\Delta T}{L}$, where k is thermal conductivity, ΔT is the temperature difference, and L is the thickness. Thus, $q = 1.5 \cdot \frac{10}{0.5} = 30 \text{ W/m}^2$.

Question: 7

During a laboratory test, a soil sample exhibits a plasticity index of 18 and a liquid limit of 40. What is the soil's classification based on the Unified Soil Classification System (USCS)?

- A. CL

- B. CH
- C. ML
- D. MH

Answer: A

Explanation:

Based on the plasticity index (PI) and liquid limit (LL), the soil is classified as CL (Clay of Low Plasticity) since it falls within the range for clay with a liquid limit greater than 20 and a plasticity index less than 25.

Question: 8

A geotechnical investigation reveals that a site contains a layer of compacted fill overlying soft clay. The engineer needs to calculate the effective stress at a depth of 5 m below the fill. If the fill has a unit weight of 18 kN/m^3 and the water table is at 2 m depth, what is the effective stress at the 5 m depth?

- A. 2.30 kPa
- B. 5.0 kPa
- C. 60.5 kPa
- D. 14.0 kPa

Answer: C

Explanation:

The effective stress (σ') can be calculated as

$\sigma' = \sigma - u$, where σ is total stress and u is pore water pressure. Total stress at 5 m is $18 \cdot 5 = 90 \text{ kPa}$, and pore water pressure at 3 m (5 m - 2 m) is $9.81 \cdot 3 = 29.43 \text{ kPa}$. Thus, $\sigma' = 90 - 29.43 = 60.57 \text{ kPa}$.

Question: 9

In performing a consolidation test, a soil specimen is subjected to a series of loading increments. If the final void ratio after consolidation is 0.5 and the initial void ratio was 1.0, what is the coefficient of consolidation (C_v) if the test duration was 24 hours and the drainage path length was 0.1 m?

- A. $0.01 \text{ m}^2/\text{yr}$
- B. $0.1 \text{ m}^2/\text{yr}$
- C. $0.5 \text{ m}^2/\text{yr}$
- D. $1.0 \text{ m}^2/\text{yr}$

Answer: C

Explanation:

The coefficient of consolidation can be estimated

using $C_v = \frac{t \cdot d^2}{H}$, where t is time in seconds, d is drainage path length, and H is the change in void ratio. Thus, converting 24 hours to seconds and substituting gives $C_v \approx 0.5 \text{ m}^2/\text{yr}$.

Question: 10

A soil sample has a moisture content of 15% and a specific gravity of solids of 2.68. If the sample's bulk density is measured at 19 kN/m^3 , what is the degree of saturation of the soil?

- A. 30%
- B. 40%
- C. 50%
- D. 60%

Answer: B

Explanation:

The degree of saturation (S) can be calculated

using the equation $S = \frac{w \cdot G}{\gamma_w}$, where w is moisture content, G is specific gravity, and γ_w is the unit weight of water. Thus,
 $S = \frac{0.15 \cdot 2.68}{9.81} \approx 0.41$ or 41%.

Thank You for Trying Our Product

For More Information – **Visit link below:**

<https://www.examsboost.com/>

15 USD Discount Coupon Code:

G74JA8UF

FEATURES

- ✓ **90 Days Free Updates**
- ✓ **Money Back Pass Guarantee**
- ✓ **Instant Download or Email Attachment**
- ✓ **24/7 Live Chat Support**
- ✓ **PDF file could be used at any Platform**
- ✓ **50,000 Happy Customer**



Visit us at: <https://www.examsboost.com/test/pe-civil-geotechnical>