PRINCIPLES AND PRACTICE OF ENGINEERING (PE) CIVIL: STRUCTURAL PRACTICE EXAM (SAMPLE)

STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

VISIT US ONLINE FOR THE FULL VERSION STUDY GUIDE

https://pe-civilstructural.examzify.com

Copyright © 2026 by Examzify - A Kaluba Technologies Inc. product.

ALL RIGHTS RESERVED.

No part of this book may be reproduced or transferred in any form or by any means, graphic, electronic, or mechanical, including photocopying, recording, web distribution, taping, or by any information storage retrieval system, without the written permission of the author.

Notice: Examzify makes every reasonable effort to obtain accurate, complete, and timely information about this product from reliable sources.

SAMPLE

Table of Contents

Copyright 1

Table of Contents 2

Introduction 3

How to Use This Guide 4

Questions 5

Answers 8

Explanations 10

Next Steps 16

SAMPLE

Introduction

Preparing for a certification exam can feel overwhelming, but with the right tools, it becomes an opportunity to build confidence, sharpen your skills, and move one step closer to your goals. At Examzify, we believe that effective exam preparation isn't just about memorization, it's about understanding the material, identifying knowledge gaps, and building the test-taking strategies that lead to success.

This guide was designed to help you do exactly that.

Whether you're preparing for a licensing exam, professional certification, or entry-level qualification, this book offers structured practice to reinforce key concepts. You'll find a wide range of multiple-choice questions, each followed by clear explanations to help you understand not just the right answer, but why it's correct.

The content in this guide is based on real-world exam objectives and aligned with the types of questions and topics commonly found on official tests. It's ideal for learners who want to:

- Practice answering questions under realistic conditions,
- Improve accuracy and speed,
- Review explanations to strengthen weak areas, and
- Approach the exam with greater confidence.

We recommend using this book not as a stand-alone study tool, but alongside other resources like flashcards, textbooks, or hands-on training. For best results, we recommend working through each question, reflecting on the explanation provided, and revisiting the topics that challenge you most.

Remember: successful test preparation isn't about getting every question right the first time, it's about learning from your mistakes and improving over time. Stay focused, trust the process, and know that every page you turn brings you closer to success.

Let's begin.

SAMPLE

How to Use This Guide

This guide is designed to help you study more effectively and approach your exam with confidence. Whether you're reviewing for the first time or doing a final refresh, here's how to get the most out of your Examzify study guide:

1. Start with a Diagnostic Review

Skim through the questions to get a sense of what you know and what you need to focus on. Your goal is to identify knowledge gaps early.

2. Study in Short, Focused Sessions

Break your study time into manageable blocks (e.g. 30 – 45 minutes). Review a handful of questions, reflect on the explanations.

3. Learn from the Explanations

After answering a question, always read the explanation, even if you got it right. It reinforces key points, corrects misunderstandings, and teaches subtle distinctions between similar answers.

4. Track Your Progress

Use bookmarks or notes (if reading digitally) to mark difficult questions. Revisit these regularly and track improvements over time.

5. Simulate the Real Exam

Once you're comfortable, try taking a full set of questions without pausing. Set a timer and simulate test-day conditions to build confidence and time management skills.

6. Repeat and Review

Don't just study once, repetition builds retention. Re-attempt questions after a few days and revisit explanations to reinforce learning. Pair this guide with other Examzify tools like flashcards, and digital practice tests to strengthen your preparation across formats.

There's no single right way to study, but consistent, thoughtful effort always wins. Use this guide flexibly, adapt the tips above to fit your pace and learning style. You've got this!

SAMPLE

Questions

SAMPLE

1. How is soil shear strength defined?

A. The total weight of soil acting on a foundation

B. The internal resistance per unit area soil can offer to resist sliding

C. The compressive strength of soil layers

D. The maximum moisture content before soil failure

2. Which direction does wood most shrink during the drying process?

A. Parallel to the wood fibers

B. Tangential to the wood rings

C. Radial to the wood rings

D. Normal to the wood fibers

3. How often should references be adjusted for temperatures affecting wood members?

A. Rarely

B. Only at the time of installation

C. Prolonged elevated temperatures

D. During final inspection

4. What type of admixture is known as a "plasticizer"?

A. Set accelerating admixture

B. Set retarding admixture

C. Water-reducing admixture

D. Corrosive inhibiting admixture

5. A system that does not have much redundancy has rho equal to what?

A. 1.0

B. 1.2

C. 1.3

D. 1.5

6. Which of the following methods is NOT a way to mitigate liquefaction?

A. Compaction

B. Drainage

C. Grouting

D. Excavation

SAMPLE

7. Which pressure is mobilized when walls move into the soil to utilize shear strength?

A. Active

B. Passive

C. Neutral

D. At rest

8. What is the difference between entrained air bubbles and entrapped air bubbles?

A. Both are intentional

B. Entrained is intentional, entrapped is unintentional

C. Both are unintentional

D. Entrained is unintentional, entrapped is intentional

9. Which design method is sometimes used in both reinforced concrete and steel design?

A. Allowable Strength Design

B. Ultimate Load Design

C. Load and Resistance Factor Design

D. Service Load Design

10. When the water table increases, what happens to the effective stress?

A. Increases

B. Decreases

C. Remains the same

D. Fluctuates

SAMPLE

Answers

SAMPLE

1. B
2. B
3. C
4. C
5. C
6. D
7. B
8. B
9. C
10. B

SAMPLE

Explanations

SAMPLE

1. How is soil shear strength defined?

A. The total weight of soil acting on a foundation

B. The internal resistance per unit area soil can offer to resist sliding

C. The compressive strength of soil layers

D. The maximum moisture content before soil failure

Soil shear strength is fundamentally defined as the internal resistance per unit area that soil can provide to withstand shear stresses, particularly those induced by forces such as loading or movement. This property is critical in geotechnical engineering as it determines the stability of soil in various conditions, such as when it is loaded by structures or during slope failures. The concept of shear strength is essential because it helps engineers and geologists predict how soil will behave under different loads and environmental conditions. It encompasses both the effective stress and the cohesion of the soil, which contribute to its ability to resist sliding and deformation. Considering the other options, the total weight of soil acting on a foundation does not address the soil's resistance to shearing. Likewise, referring to compressive strength pertains to the ability of soil to withstand axial loads rather than lateral forces. Finally, maximum moisture content relates to the water-soil interaction and does not directly define shear strength, although it can indirectly affect the strength characteristics of soil. Understanding shear strength is crucial for ensuring safe and effective foundation design and slope stability analysis in civil engineering projects.

2. Which direction does wood most shrink during the drying process?

A. Parallel to the wood fibers

B. Tangential to the wood rings

C. Radial to the wood rings

D. Normal to the wood fibers

The most significant direction of wood shrinkage during the drying process is tangential to the wood rings. This phenomenon occurs because of the inherent structure of wood, which is made up of cellular materials that lock in moisture content. When wood dries, the cells lose water, primarily affecting dimensions perpendicular to the grain more significantly than along the grain. The tangential shrinkage is greater than both radial shrinkage and shrinkage parallel to the grain. This is due to the way growth rings are structured; they contain more moisture in the tangential direction compared to the radial direction. Additionally, as wood fibers are relatively resistant to change in length along the grain, shrinking parallel to the wood fibers is the least significant. Radial shrinkage, while present, is typically less than tangential shrinkage because it occurs at a right angle to the growth rings and affects the wood's diameter to a lesser extent. Normal to the wood fibers refers to growth characteristics that contribute to various behaviors of wood shrinkage but do not directly correlate with the most significant magnitude of change in dimension relative to drying. Understanding these shrinkage patterns is crucial, especially in applications where wood is used in structural elements, as it informs material design and maintenance strategies to accommodate changes in moisture content.

SAMPLE

3. How often should references be adjusted for temperatures affecting wood members?

A. Rarely

B. Only at the time of installation

C. Prolonged elevated temperatures

D. During final inspection

The adjustment of references for temperatures affecting wood members is critical, particularly because wood is susceptible to changes in moisture content and thermal conditions, which can significantly impact its structural integrity and performance. Prolonged elevated temperatures can lead to various issues, such as increased risk of deterioration, changes in mechanical properties, and susceptibility to fungal growth. When wood members are subjected to elevated temperatures over an extended period, their properties can change, necessitating adjustments in how they are evaluated and used in structural applications. For instance, prolonged exposure to high temperatures can result in loss of strength and stiffness, which must be taken into account during design and material selection to ensure safety and performance standards are met. Thus, the frequency of adjustments tied to thermal conditions is particularly critical in scenarios where wood may experience continued elevated temperatures, warranting regular assessment to accommodate any degradation and ensure reliability within the structure. Other options do not emphasize the importance of this ongoing monitoring and adjustment based on temperature conditions, leading to a less robust structural performance over time.

4. What type of admixture is known as a "plasticizer"?

A. Set accelerating admixture

B. Set retarding admixture

C. Water-reducing admixture

D. Corrosive inhibiting admixture

Plasticizers are a type of water-reducing admixture that enhance the workability of concrete without the need for additional water. By reducing the water content required for a given consistency, plasticizers help improve the flow properties of the concrete mix. This results in a more workable mixture that can be easily placed and finished, all while maintaining the strength and durability of the setting concrete. Water-reducing admixtures achieve this by altering the surface properties of the cement particles, allowing for better dispersion and reducing the friction between them. This characteristic makes them particularly valuable in construction applications where workability is a concern, especially in intricate formwork or during cold weather where concrete might be hard to manipulate. In contrast, set accelerating admixtures aim to speed up the setting time of concrete, while set retarding admixtures extend the setting time. Corrosive inhibiting admixtures, on the other hand, primarily work to protect against corrosion, particularly in steel reinforcement. Thus, they serve different functions that do not directly deal with improving workability in the way plasticizers do.

SAMPLE

5. A system that does not have much redundancy has rho equal to what?

A. 1.0

B. 1.2

C. 1.3

D. 1.5

In structural engineering, "rho" (ρ) often refers to a measure of redundancy in a structural system. A system with low redundancy typically indicates that there are not many alternative load paths for transferring loads. This means that if one element were to fail, the entire system could become compromised. In this context, if a structural system has very little redundancy, it is assigned a lower resistance factor, and a value of approximately 1.3 is commonly used to reflect that limited redundancy. A rho value of 1.0 would typically suggest a fully reliable system capable of withstanding loads without relying on alternative pathways or backups. Values higher than 1.3 indicate increasing redundancy. Thus, 1.3 effectively represents a condition that balances between minimal redundancy without crossing into complete reliability, highlighting the inherent risks present when redundancy is low. This understanding is crucial in design considerations, especially in ensuring safety and stability for structures with varying degrees of redundancy.

6. Which of the following methods is NOT a way to mitigate liquefaction?

A. Compaction

B. Drainage

C. Grouting

D. Excavation

The correct answer highlights that excavation is not an effective method to mitigate liquefaction. Liquefaction occurs in saturated soils, typically during seismic events, where the soil loses strength and behaves like a liquid due to pore water pressure exceeding the soil's ability to support loads. Compaction is a well-established method for addressing liquefaction because it increases the density of the soil, reduces void spaces, and enhances its strength characteristics. By densifying the soil, the potential for liquefaction is significantly decreased during seismic activities. Drainage helps mitigate liquefaction by reducing pore water pressure. It allows water to escape from the soil during seismic loading, which helps the soil maintain stability and prevent the loss of strength. Grouting involves injecting a material into the soil to fill voids and enhance stability. This process can significantly improve the soil's properties, making it more resistant to liquefaction by increasing cohesion and reducing the soil's compressibility. Excavation alone does not address the underlying issue of soil saturation and does not improve the soil's resistance to liquefaction. If anything, removing soil can create additional instability, especially if adequate measures are not taken to manage the groundwater conditions. Thus, while excavation may be part of a larger remediation strategy,

SAMPLE

7. Which pressure is mobilized when walls move into the soil to utilize shear strength?

A. Active

B. Passive

C. Neutral

D. At rest

The pressure mobilized when walls move into the soil to utilize shear strength is referred to as passive pressure. This occurs when a wall, such as a retaining wall, moves toward the soil, resulting in an increase in soil pressure due to the deformation of the soil mass. Passive pressure is developed when the wall moves away from the initial position, allowing the soil to build up resistance against the wall. This resistance is due to the soil's shear strength, which can be mobilized when the wall displaces. The concept is crucial in retaining wall design because it affects how the wall interacts with the soil and must be considered to ensure stability and avoid structural failure. Other pressures, like active pressure, pertain to the conditions where the soil moves to a new equilibrium position, and at-rest pressures occur when there is no movement between the wall and the soil. Neutral pressure relates to pore water pressures and does not directly involve the shear resistance of soil in the same way that passive pressure does. Understanding these concepts is essential for civil engineers when designing structures to cope with soil interaction.

8. What is the difference between entrained air bubbles and entrapped air bubbles?

A. Both are intentional

B. Entrained is intentional, entrapped is unintentional

C. Both are unintentional

D. Entrained is unintentional, entrapped is intentional

The distinction between entrained air bubbles and entrapped air bubbles is significant in concrete technology and impacts the performance, durability, and workability of concrete mixtures. Entrained air bubbles are intentionally introduced into the concrete mix through the use of air-entraining agents during batching. This process creates small, stable air bubbles that serve to improve freeze-thaw resistance, increase workability, and reduce the risk of cracking due to expansion from freezing water. The presence of these deliberately created air pockets helps provide a cushion for the water in the mixture, allowing for volume changes without significant damage to the concrete. In contrast, entrapped air bubbles occur unintentionally, typically as a result of the mixing process where air becomes trapped within the mixture. These bubbles can be larger and more irregularly shaped compared to entrained air bubbles and do not provide the same benefits. Entrapped air is generally considered undesirable as it can adversely affect the strength and durability of the concrete. Thus, understanding this distinction is critical for civil engineers when designing concrete mixtures, as the intentional incorporation of entrained air can lead to high-performance concrete, while unintended entrapped air complicates the structural integrity and performance of the final product.

SAMPLE

9. Which design method is sometimes used in both reinforced concrete and steel design?

A. Allowable Strength Design

B. Ultimate Load Design

C. Load and Resistance Factor Design

D. Service Load Design

Load and Resistance Factor Design (LRFD) is a widely used design method in both reinforced concrete and steel design. This approach considers various uncertainties in loads and material strengths by using load factors and resistance factors to ensure a structure's safety and performance under various conditions. In LRFD, loads are multiplied by specific factors that account for potential variations in expected loads due to unforeseen conditions such as changes in use, environmental factors, or construction errors. Similarly, the strengths of materials are also reduced by resistance factors, which consider uncertainties in the material properties and imperfections in the construction process. This method creates a more uniform level of safety across different types of materials and construction methods, which is especially beneficial in hybrid structures that use both reinforced concrete and steel elements. Other design methods may be more tailored to specific materials, such as Ultimate Load Design, which primarily focuses on the capacity of a structure under maximum loads, or Allowable Strength Design, which sets limits based on allowable stress values specific to certain materials. Service Load Design focuses on the conditions under normal service loads, which may not adequately account for the variabilities inherent in both steel and concrete. In contrast, LRFD provides a systematic and flexible way to ensure structural reliability and safety across various design contexts.

10. When the water table increases, what happens to the effective stress?

A. Increases

B. Decreases

C. Remains the same

D. Fluctuates

The effective stress is defined as the stress carried by the soil skeleton and is calculated as the total stress minus the pore water pressure. When the water table increases, the pore water pressure within the soil also increases because there is additional water exerting pressure in the voids of the soil. As the pore water pressure increases, it directly affects the effective stress, which is given by the equation: Effective Stress = Total Stress - Pore Water Pressure When the pore water pressure increases due to a rising water table, the term for pore water pressure in the equation becomes larger. Since the total stress (also known as the overburden pressure) generally remains constant in the short term, the increase in pore water pressure results in a decrease in effective stress. This decrease in effective stress can impact the strength and stability of the soil, making it a critical factor in geotechnical engineering and foundation design. Therefore, an increase in the water table leads to a reduction in effective stress, which aligns with the understanding that effective stress is essential in assessing soil behavior under varying groundwater conditions.

SAMPLE

Next Steps

Congratulations on reaching the final section of this guide. You've taken a meaningful step toward passing your certification exam and advancing your career.

As you continue preparing, remember that consistent practice, review, and self-reflection are key to success. Make time to revisit difficult topics, simulate exam conditions, and track your progress along the way.

If you need help, have suggestions, or want to share feedback, we'd love to hear from you. Reach out to our team at hello@examzify.com.

Or visit your dedicated course page for more study tools and resources:

https://pe-civilstructural.examzify.com

We wish you the very best on your exam journey. You've got this!

SAMPLE