

Principles and Practice of Engineering (PE) Civil: Breadth Practice Exam (Sample)

Study Guide



Everything you need from our exam experts!

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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.

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!

Questions

- 1. What are fine screens designed to filter out?**
 - A. Sand and silt**
 - B. Larger debris**
 - C. Tiny microorganisms**
 - D. Suspended solids**
- 2. What is required capacity on a structure based on factored loads called?**
 - A. Design load**
 - B. Factored demand**
 - C. Live load**
 - D. Service load**
- 3. What percentage of solids is typically removed during primary wastewater treatment?**
 - A. 30%**
 - B. 40%**
 - C. 50%**
 - D. 60%**
- 4. What mechanism does a band screen employ for its operation?**
 - A. A continuous flow of water**
 - B. A fixed band of perforated screens**
 - C. A rotating drum**
 - D. A static collection plate**
- 5. How is time between successive vehicles typically calculated?**
 - A. Spacing divided by flow rate**
 - B. Total volume divided by number of vehicles**
 - C. Density divided by speed**
 - D. 3600 divided by flow rate**

- 6. What is the study of forces and motion on physical objects known as?**
- A. Kinematics**
 - B. Dynamics**
 - C. Mechanics**
 - D. Thermodynamics**
- 7. Which of the following terms is used to describe the structural design based on factored loads?**
- A. Allowable Strength Design**
 - B. Service Load Design**
 - C. Strength Design**
 - D. Static Load Design**
- 8. Which type of water is suitable for producing concrete according to ASTM standards?**
- A. Recycled Water**
 - B. Potable Water**
 - C. Tap Water**
 - D. Distilled Water**
- 9. In the allowable strength design method, what must the actual calculated stress not exceed?**
- A. Ultimate stress**
 - B. Allowable stress**
 - C. Yield strength**
 - D. Design strength**
- 10. How is the Average Running Speed calculated according to the provided definitions?**
- A. Actual hourly volume divided by peak rate flow**
 - B. Peak rate flow minus total delay time**
 - C. Total travel time divided by travel distance**
 - D. Travel distance multiplied by peak rate**

Answers

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

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Explanations

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1. What are fine screens designed to filter out?

- A. Sand and silt**
- B. Larger debris**
- C. Tiny microorganisms**
- D. Suspended solids**

Fine screens are primarily designed to filter out smaller solids such as sand and silt from water or wastewater. Their function is to remove particulates that are larger than the mesh size of the screen, which typically ranges from 1/16 to 1/8 inch. By effectively capturing these finer materials, fine screens help to prevent clogs and protect downstream treatment processes, ensuring that the system operates efficiently. While larger debris is typically removed by coarser screens rather than fine screens, and tiny microorganisms would require different treatment processes such as filtration or disinfection, fine screens are specifically effective at capturing the smaller particulates like sand and silt that can disrupt water quality and treatment operations. Suspended solids encompass a broader category that includes a variety of particulates; however, fine screens specifically focus on those finer particles that can significantly impact water quality.

2. What is required capacity on a structure based on factored loads called?

- A. Design load**
- B. Factored demand**
- C. Live load**
- D. Service load**

The term that refers to the required capacity on a structure based on factored loads is known as the design load. When engineers design a structure, they consider various loads that the structure will experience, such as dead loads (permanent/static loads) and live loads (temporary/dynamic loads). To ensure safety and account for uncertainties, these loads are factored, usually through a combination of safety factors or load factors, which increase the load values. The design load is critical because it represents the maximum load that a structure is intended to support during its service life, providing a margin for safety against failure and ensuring that the structure can withstand expected and unexpected forces. By adhering to the design load criteria, engineers are able to create safe and resilient structures that meet regulatory standards and protect public safety. In contrast, the other terms listed do not accurately describe this concept. Factored demand relates more to the analysis of loads under specific conditions rather than the design itself. Live load specifically refers to the movable loads on a structure, which are part of the design considerations but do not encompass the entirety of the required capacity. Service load is associated with the loads that a structure is expected to carry under normal conditions without any factors applied, which differs from the design load that

3. What percentage of solids is typically removed during primary wastewater treatment?

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

In primary wastewater treatment, the goal is to remove a significant portion of suspended solids and some organic matter before the wastewater proceeds to secondary treatment processes. Typically, this initial stage of treatment can effectively remove about 50% to 60% of the total suspended solids present in the wastewater. The process involves the physical methods of sedimentation, where solids settle to the bottom of a settling tank, along with screening to eliminate larger debris. The percentage of solid material removed during this phase can vary depending on the design and operational effectiveness of the treatment facility, the characteristics of the wastewater being treated, and the specific technologies employed. Given this context, a removal percentage of 60% aligns well with the expected performance of many primary treatment systems, as they are designed specifically to address and reduce the bulk of solids before further treatment steps, making the selection of 60% a valid representation of what is typically achieved during primary treatment.

4. What mechanism does a band screen employ for its operation?

- A. A continuous flow of water
- B. A fixed band of perforated screens**
- C. A rotating drum
- D. A static collection plate

A band screen operates based on the principle of using a fixed band of perforated screens to separate solids from liquids. In this mechanism, the band is typically constructed from materials that allow for the passage of liquid while retaining larger particles or debris. The perforations on the band facilitate the flow of the liquid through the screen while trapping solids, which can then be collected for removal or further processing. This design is particularly effective in wastewater treatment and other applications where it's necessary to filter out larger contaminants from a flowing liquid. The fixed band structure provides stability and durability, ensuring that the screen can withstand the operational conditions without compromising its filtering capability. This method is advantageous because it allows for continuous operation, providing a consistent and reliable means of separating solid materials from liquid flows. Other mechanisms like a rotating drum or a static collection plate do not employ the same principles of continuous filtration through a band of perforated material, and their designs serve different purposes in various contexts. The continuous flow of water is associated with the operation of many filtration systems, but without the fixed band of perforated screens, it does not define the specific mechanism of a band screen.

5. How is time between successive vehicles typically calculated?

- A. Spacing divided by flow rate**
- B. Total volume divided by number of vehicles**
- C. Density divided by speed**
- D. 3600 divided by flow rate**

The time between successive vehicles is typically calculated using the formula that involves the flow rate of vehicles per hour. When traffic flow is measured in vehicles per hour, the time gap between each vehicle can be determined by taking the total number of seconds in an hour, which is 3600 seconds, and dividing it by the flow rate in vehicles per hour. This calculation gives the time interval (in seconds) that will elapse between one vehicle passing a fixed point and the next vehicle passing that same point. Essentially, this allows traffic engineers to assess and manage the flow of vehicles on roadways effectively, ensuring that they can implement necessary changes to improve traffic flow and reduce congestion. In contrast, other methods mentioned in the options do not directly yield the time between vehicles in this manner. For instance, spacing divided by flow rate would not represent a direct relationship to time between vehicles without additional context. Similarly, total volume divided by number of vehicles measures something entirely different, as does density divided by speed, which pertains to the speed of vehicles rather than the timing aspect. Thus, dividing 3600 by flow rate is the straightforward and accurate method to determine the time between successive vehicles.

6. What is the study of forces and motion on physical objects known as?

- A. Kinematics**
- B. Dynamics**
- C. Mechanics**
- D. Thermodynamics**

The study of forces and motion on physical objects is known as mechanics. Mechanics encompasses both statics, which deals with objects at rest, and dynamics, which focuses on objects in motion and the forces that affect that motion. This broad field covers the principles of motion and the forces that cause changes in motion, making it foundational to understanding how physical objects behave in various conditions. Kinematics is a subset of mechanics that specifically deals with the description of motion without considering the forces causing that motion. Dynamics, while related and concerned with motion as influenced by forces, represents only one aspect of the larger field of mechanics. Thermodynamics, on the other hand, deals with heat and temperature and their relation to energy and work, which is outside the realm of forces and motion of physical objects. Thus, mechanics is the most comprehensive and correct term for the study in question.

7. Which of the following terms is used to describe the structural design based on factored loads?

- A. Allowable Strength Design**
- B. Service Load Design**
- C. Strength Design**
- D. Static Load Design**

The term that describes structural design based on factored loads is known as Strength Design. This method incorporates safety factors into the design process to ensure that structures can support loads beyond those anticipated during normal use. By using factored loads, engineers account for uncertainties in load estimations, materials, and potential variations in environmental conditions. Strength Design is particularly associated with the design of concrete and steel structures, where the ultimate strength of materials is paired with factored loads to evaluate whether the structure will remain safe under expected conditions. This approach emphasizes the need to ensure that the structure can withstand loads that are typically higher than the service loads it will encounter throughout its lifecycle. Using this method, engineers can confidently predict how structures will behave under both normal and extreme conditions, prioritizing safety and stability. In contrast, the other terms refer to different design methodologies and considerations that do not focus on factored loads in the same way.

8. Which type of water is suitable for producing concrete according to ASTM standards?

- A. Recycled Water**
- B. Potable Water**
- C. Tap Water**
- D. Distilled Water**

The suitable type of water for producing concrete according to ASTM standards is potable water. Potable water is defined as water that is safe for human consumption and typically meets stringent quality standards. This is crucial for concrete production because the quality of water used can significantly impact the strength and durability of the final concrete mix. Using potable water ensures that there are no harmful substances or contaminants that could interfere with the hydration process of the cement or adversely affect the concrete's properties. ASTM C94, which governs ready-mixed concrete, specifies that water used in making the concrete should be clean and free from harmful chemicals or impurities. While other types of water, such as recycled water or tap water, may also be suitable under certain conditions, potable water is the most universally accepted standard that guarantees the necessary quality for concrete. This helps ensure that the concrete adheres to the required performance specifications and is durable over its intended lifespan.

9. In the allowable strength design method, what must the actual calculated stress not exceed?

- A. Ultimate stress**
- B. Allowable stress**
- C. Yield strength**
- D. Design strength**

In the allowable strength design method, the critical aspect is that the actual calculated stress must not exceed the allowable stress. This concept ensures that structures are designed within safe limits to avoid failure during service conditions. Allowable stress is derived from material properties and safety factors, accounting for uncertainties in the material and loading conditions. By ensuring that the actual stress remains below this threshold, engineers can provide a margin of safety against potential failure mechanisms such as yielding, buckling, or cracking, which could occur if the material is subjected to excessive loads. Using allowable stress as the standard allows for a systematic approach to design and helps maintain structural integrity through a balance of strength and safety. The other terms listed, such as ultimate stress and yield strength, are related to material properties but do not represent the specific criteria used in the allowable strength design framework. Design strength is also influenced by various factors, including safety factors, and does not straightforwardly define the limit for actual stress in the way that allowable stress does.

10. How is the Average Running Speed calculated according to the provided definitions?

- A. Actual hourly volume divided by peak rate flow**
- B. Peak rate flow minus total delay time**
- C. Total travel time divided by travel distance**
- D. Travel distance multiplied by peak rate**

The Average Running Speed is determined by taking the actual hourly volume and dividing it by the peak rate flow. This definition highlights the relationship between vehicle flow and the traffic conditions at peak times. By calculating the actual volume of traffic that moves during a specific period and relating it to the peak flow, engineers can assess how effectively the roadway is operating under the maximum expected conditions. This method provides valuable insights for traffic management and roadway design, as it reflects real-world scenarios where vehicle movements are often constrained by varying factors, such as delays, congestion, and variations in traffic patterns throughout the day. Understanding this ratio helps engineers implement appropriate measures to optimize road usage and improve overall traffic efficiency.

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-civilbreadth.examzify.com>

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