

# National Council of Examiners for Engineering and Surveying (NCEES) Fundamentals of Engineering (FE) Environmental 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. Which equation represents the calculation for exact alkalinity?
  - A.  $\text{exact alk} = [\text{HCO}_3^-] + [\text{OH}^-] - [\text{H}^+]$
  - B.  $\text{exact alk} = [\text{HCO}_3^-] + 2[\text{CO}_3^{2-}]$
  - C.  $\text{exact alk} = [\text{HCO}_3^-] + 2[\text{CO}_3^{2-}] + [\text{OH}^-] - [\text{H}^+]$
  - D.  $\text{exact alk} = [\text{CO}_3^{2-}] + [\text{H}^+]$
2. What is the typical depth required for an aerobic pond to maintain dissolved oxygen levels?
  - A. Shallow depth
  - B. Deep depth
  - C. Moderate depth
  - D. Varying depth
3. Which of the following is a common method for reducing greenhouse gas emissions?
  - A. Increased use of fossil fuels
  - B. Promoting public transportation and alternative fuels
  - C. Expanding mining operations
  - D. Increasing industrial waste generation
4. What does the Sludge Volume Index (SVI) equation determine in wastewater treatment?
  - A. Rate of aeration
  - B. Amount of sludge to be returned
  - C. Volume of primary sludge
  - D. Detention time in the tank
5. According to MCL standards, what percentage of samples can test positive for total coliform?
  - A. Less than 5% of 40 samples per month
  - B. Less than 10% of 50 samples per month
  - C. No more than 1% of all samples
  - D. Should be 0% of samples

- 6. Which chemical is known for its potential to cause immunotoxic effects?**
- A. CCl<sub>4</sub>**
  - B. Lead**
  - C. Mercury**
  - D. Arsenic**
- 7. What is the unit for solids residence time in wastewater treatment?**
- A. Minutes**
  - B. Days**
  - C. Hours**
  - D. Seconds**
- 8. What are the characteristics of hazardous waste?**
- A. It can be biodegradable, recyclable, or reusable**
  - B. It can be toxic, reactive, ignitable, or corrosive**
  - C. It is always liquid and harmful**
  - D. It has a significant economic value**
- 9. Which method is used for the oxidation/reduction treatment of hazardous waste?**
- A. Neutralization**
  - B. Stabilization/solidification**
  - C. Incineration**
  - D. Ion exchange**
- 10. During which process is floc formation primarily initiated?**
- A. Filtration**
  - B. Rapid mixing**
  - C. Sedimentation**
  - D. Disinfection**



## **Answers**

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

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## **Explanations**

1. Which equation represents the calculation for exact alkalinity?

A.  $\text{exact alk} = [\text{HCO}_3^-] + [\text{OH}^-] - [\text{H}^+]$

B.  $\text{exact alk} = [\text{HCO}_3^-] + 2[\text{CO}_3^{2-}]$

C.  $\text{exact alk} = [\text{HCO}_3^-] + 2[\text{CO}_3^{2-}] + [\text{OH}^-] - [\text{H}^+]$

D.  $\text{exact alk} = [\text{CO}_3^{2-}] + [\text{H}^+]$

The correct calculation for exact alkalinity incorporates the contributions from bicarbonate ions, carbonate ions, hydroxide ions, and the depletion due to hydrogen ions in solution. Exact alkalinity is defined as the capacity of water to neutralize acids, and it is determined by several species in an aqueous solution. The bicarbonate ion ( $[\text{HCO}_3^-]$ ), the carbonate ion ( $[\text{CO}_3^{2-}]$ ), hydroxide ion ( $[\text{OH}^-]$ ), and hydrogen ion ( $[\text{H}^+]$ ) concentrations all contribute to the overall alkalinity. In the equation that represents exact alkalinity, bicarbonate contributes one unit of alkalinity per molecule, and each carbonate contributes two units due to its potential to react with two protons ( $\text{H}^+$ ). The hydroxide ion also contributes directly to alkalinity because it can neutralize an acid, raising the overall alkalinity. Conversely, hydrogen ions reduce the alkalinity because they represent acid in solution that can react with the alkalinity sources. Thus, the equation  $[\text{HCO}_3^-] + 2[\text{CO}_3^{2-}] + [\text{OH}^-] - [\text{H}^+]$  accurately accounts for the contributions and influences of all relevant ions in determining the total alkal

2. What is the typical depth required for an aerobic pond to maintain dissolved oxygen levels?

A. Shallow depth

B. Deep depth

C. Moderate depth

D. Varying depth

The typical depth required for an aerobic pond to maintain dissolved oxygen levels is generally shallow. Shallow depths are beneficial because they allow for increased light penetration and enhanced aeration, which support the growth of photosynthetic aquatic plants and microorganisms. These organisms contribute to oxygen production through photosynthesis, thereby maintaining higher levels of dissolved oxygen, which is essential for the aerobic processes that break down organic matter in the pond. Shallow ponds also facilitate better gas exchange at the water-air interface, promoting the diffusion of oxygen into the water. This is particularly important in aerobic ponds where oxygen availability is a critical factor for supporting aerobic bacteria that decompose organic materials. While deeper ponds can offer some advantages in terms of volume and retention time, they may lead to reduced light penetration and limited mixing, which can adversely affect the dissolved oxygen levels needed for efficient aerobic treatment. Thus, the shallow depth characteristic is key for the effective functioning of an aerobic pond in maintaining desired dissolved oxygen levels.

**3. Which of the following is a common method for reducing greenhouse gas emissions?**

- A. Increased use of fossil fuels**
- B. Promoting public transportation and alternative fuels**
- C. Expanding mining operations**
- D. Increasing industrial waste generation**

Promoting public transportation and alternative fuels is a common method for reducing greenhouse gas emissions because it encourages a shift away from individual car usage, which typically relies on traditional fossil fuels. By increasing the availability and appeal of public transport, along with the use of alternative fuels such as biofuels, electricity, or hydrogen, emissions from vehicles can be significantly lowered. This method not only reduces the total amount of greenhouse gases released into the atmosphere but also alleviates traffic congestion, leading to improved energy efficiency overall. In urban areas, public transportation systems can carry many passengers at once, making them far more efficient than multiple single-occupancy vehicles. Additionally, transitioning to alternative fuels helps further cut emissions from the transportation sector, which is one of the largest contributors to greenhouse gas pollution. Implementing these strategies supports sustainable urban development and combat climate change effectively.

**4. What does the Sludge Volume Index (SVI) equation determine in wastewater treatment?**

- A. Rate of aeration**
- B. Amount of sludge to be returned**
- C. Volume of primary sludge**
- D. Detention time in the tank**

The Sludge Volume Index (SVI) is a critical parameter in wastewater treatment processes, particularly in understanding the characteristics of the activated sludge. It is defined as the volume of settled mixed liquor (activated sludge) after a specific settling time, typically expressed in milliliters per gram of suspended solids. The SVI is instrumental in assessing the settleability of sludge; it provides insight into how well the sludge will separate from the treated wastewater. A lower SVI indicates better sludge settleability, while a higher SVI suggests poor settling characteristics, which can influence the efficiency of the treatment process. By determining the SVI, operators can make informed decisions about the amount of sludge that should be returned to the aeration system. This return flow is crucial for maintaining the biological processes necessary for efficient treatment, as it ensures that an adequate concentration of microorganisms remains in the system. Understanding SVI helps operators fine-tune their sludge return strategies, balancing the need for effective treatment and preventing issues such as rising sludge or excessive return flows that can complicate treatment operations. Therefore, the correct interpretation of the Sludge Volume Index directly relates to optimizing the amount of sludge that needs to be returned to the system to maintain operational stability and adherence to treatment objectives.

**5. According to MCL standards, what percentage of samples can test positive for total coliform?**

- A. Less than 5% of 40 samples per month**
- B. Less than 10% of 50 samples per month**
- C. No more than 1% of all samples**
- D. Should be 0% of samples**

The correct choice reflects the regulatory standards for total coliform in drinking water as outlined by the Microbiological Contaminants Action Level (MCL) standards established by the U.S. Environmental Protection Agency (EPA). Under these standards, the allowable threshold for positive test results indicates that a specific percentage of samples is permissible if the distribution system has a high number of samples being tested over a month. In the context of MCL standards, the requirement for total coliform bacteria is that no more than 5% of samples can test positive within a month if 40 samples are collected. This allows for some level of monitoring flexibility in larger water systems while ensuring that overall water quality remains safe. This choice underscores the importance of consistent water quality monitoring and reflects the understanding that maintaining a zero percentage of positive samples, while ideal, may not be practical for all systems, especially those serving larger populations. Instead, it creates a threshold that aligns with routine operational variability while safeguarding public health. The other options do not accurately reflect the accepted limits set forth by the MCL standards for total coliform, as they either set too low a threshold or are not aligned with the guidance provided for conventional water sampling protocols.

**6. Which chemical is known for its potential to cause immunotoxic effects?**

- A. CCl<sub>4</sub>**
- B. Lead**
- C. Mercury**
- D. Arsenic**

Mercury is known for its potential to cause immunotoxic effects due to its ability to interfere with various immune system functions. This heavy metal can disrupt the normal activity of immune cells, leading to altered immune responses and increased susceptibility to infections or autoimmune diseases. Mercury exposure, particularly in its organic forms such as methylmercury, can affect both humoral and cell-mediated immunity, resulting in a range of adverse health effects. Understanding the immunotoxicity of mercury is crucial, especially for vulnerable populations such as pregnant women and children, as it can also affect neurodevelopment and overall health outcomes. The recognition of mercury's impact on the immune system plays a significant role in assessing environmental health risks and in regulatory decisions regarding mercury emissions and exposure limits.

**7. What is the unit for solids residence time in wastewater treatment?**

- A. Minutes**
- B. Days**
- C. Hours**
- D. Seconds**

In wastewater treatment, solids residence time, often referred to as sludge age or mean cell residence time, is a critical parameter that indicates how long the solids remain in the treatment system. The unit of measurement for this residence time is typically in days. This is because the biological processes that treat solids, particularly in aerobic digestion or anaerobic digestion, often require several days to effectively break down and stabilize the organic matter in the sludge. Measuring solids residence time in days allows for a clearer understanding of the process dynamics and ensures that there is sufficient time for microorganisms to decompose the waste effectively. An appropriate residence time is crucial for optimizing the treatment process, enhancing microbial growth, and achieving effective removal of contaminants. Using shorter time frames, such as minutes, hours, or seconds, is generally not practical for evaluating the performance of biological wastewater treatment processes, as these processes rely on longer durations to achieve significant treatment results. Therefore, the standard unit for solids residence time is expressed in days, making it the most suitable answer in this context.

**8. What are the characteristics of hazardous waste?**

- A. It can be biodegradable, recyclable, or reusable**
- B. It can be toxic, reactive, ignitable, or corrosive**
- C. It is always liquid and harmful**
- D. It has a significant economic value**

The characteristics of hazardous waste are primarily defined by their potential to cause harm to human health or the environment. The correct choice highlights that hazardous waste can be toxic, reactive, ignitable, or corrosive. To elaborate, toxicity refers to the ability of a substance to cause harm to living organisms, reflecting its potential to induce health risks or ecological damage. Reactivity indicates that a waste may undergo violent chemical reactions under certain conditions, which can lead to explosions or the release of toxic fumes. Ignitability indicates the waste can easily catch fire and cause fire hazards, while corrosivity refers to the ability of a waste to corrode materials, including metals, and can damage human tissues or the environment through chemical reactions. These characteristics help properly classify hazardous wastes, which is essential for their management and disposal to minimize risks to public health and the environment. Understanding these properties is crucial for environmental engineering and regulatory compliance.

**9. Which method is used for the oxidation/reduction treatment of hazardous waste?**

- A. Neutralization**
- B. Stabilization/solidification**
- C. Incineration**
- D. Ion exchange**

The method used for the oxidation/reduction treatment of hazardous waste is incineration. This process involves the thermal treatment of waste materials, whereby hazardous substances are subjected to high temperatures, resulting in their combustion. During incineration, organic compounds undergo oxidation, transforming into simpler, less harmful substances such as carbon dioxide and water. This method is particularly effective in reducing the volume of waste and destroying toxic substances, thus mitigating potential environmental impacts. Incineration also allows for the recovery of energy from waste, which can be harnessed for various applications. In the context of hazardous waste treatment, it serves as a critical technology for dealing with materials that are difficult to manage via other means, ensuring compliance with environmental regulations aimed at protecting public health and the environment. While the other methods listed have their applications in waste management, they do not primarily focus on oxidation/reduction processes. Neutralization relates to adjusting the pH of hazardous materials, stabilization/solidification aims at immobilizing contaminants within a solid matrix, and ion exchange is used for removing specific ions from wastewater. Each of these methods addresses different facets of hazardous waste treatment but does not involve oxidation/reduction in the same transformative manner as incineration.

**10. During which process is floc formation primarily initiated?**

- A. Filtration**
- B. Rapid mixing**
- C. Sedimentation**
- D. Disinfection**

Floc formation is primarily initiated during the rapid mixing process. This stage is crucial in water treatment as it involves the addition of coagulants, which are chemicals that help destabilize colloidal particles in the water. During rapid mixing, these coagulants are thoroughly mixed with the water, enabling them to react with the particles to form flocs—larger aggregates of particles that can be more easily removed from the water in subsequent treatment stages. The mixing intensity during this process is important as it needs to be strong enough to ensure uniform distribution of the coagulants but not so vigorous that it breaks apart the newly formed flocs. Once flocs are formed, they can then settle out during the sedimentation process, where their removal from the water is facilitated. Each of the other processes listed, such as filtration, sedimentation, and disinfection, plays an essential role in water treatment; however, they occur at different stages and do not primarily initiate floc formation. Filtration, for instance, is used to remove particles and pathogens from water after flocs have already been formed and settled. Sedimentation is focused on the settling of these flocs post-formation, and disinfection targets pathogens in the water, typically after other physical treatment processes.



## 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](mailto:hello@examzify.com).**

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

**<https://ncees-fundamentalsofengineeringenvironmental.examzify.com>**

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