FHWA Bridge Inspection Techniques for NSTM (NHI-22-079 130078) Practice Test (Sample)

Study Guide

BY EXAMZIFY

Everything you need from our exam experts!

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

Table of Contents

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 of the following is NOT a production discontinuity?**
   - **A. Surface imperfections**
   - **B. Notches**
   - **C. Porosity**
   - **D. Laminations**

2. **Which two factors control the number of cycles in fatigue life?**
   - **A. Temperature and humidity**
   - **B. ADTT and n**
   - **C. Material grade and weld size**
   - **D. Cross-section area and yield strength**

3. **Which failure type is linked to T1 steel butt welds according to the notes?**
   - **A. Rivet hole filled with wellment started a crack**
   - **B. Impact damage**
   - **C. Overloaded gusset plates**
   - **D. T1 steel butt weld failure**

4. **Which property best describes the ability to absorb energy before fracturing?**
   - **A. Ductility**
   - **B. Hardness**
   - **C. Toughness**
   - **D. Brittleness**

5. **Which fatigue stage is described as unstable?**
   - **A. Initiation**
   - **B. Propagation**
   - **C. Failure**
   - **D. All stages are unstable**

6. Which property is a measure of how steel resists permanent deformation under load?

- **A. Ductility**
- **B. Elastic Modulus**
- **C. Yield Strength**
- **D. Toughness**

7. Which statement accurately describes brittle fracture?

- **A. No warning prior to failure; sudden**
- **B. Requires large plastic deformation before failure**
- **C. Occurs at high temperatures with necking**
- **D. Brittle fractures lack warning but that's not always; no clear sign before failure**

8. Which issue was observed on the I-276 Delaware River-Turnpike Toll Bridge?

- **A. T1 steel butt weld failure**
- **B. Impact damage**
- **C. Overloaded gusset plates**
- **D. Rivet hole filled with wellment started a crack**

9. What safety issues are associated with confined spaces?

- **A. Lack of Oxygen, Toxic Gas, Darkness**
- **B. Open air and wind**
- **C. Adequate oxygen and bright light**
- **D. No safety issues**

10. Distortion Induced Fatigue results from what type of forces?

- **A. Primary bending forces**
- **B. Secondary forces**
- **C. Torsional loads**
- **D. Thermal expansion**

Answers

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

Explanations

1. Which of the following is NOT a production discontinuity?

A. Surface imperfections

B. Notches

C. Porosity

D. Laminations

Production discontinuities are flaws that arise during the making of the metal member itself. Surface imperfections, notches, and laminations are classic examples of defects introduced by the fabrication or manufacturing process: surface roughness or scale, geometric irregularities from forming, and internal layered defects from the material production. Porosity, on the other hand, is a void that typically originates in castings or welds rather than in the standard production of rolled structural shapes. In this context, porosity isn't considered a production discontinuity of the member itself, so it’s the choice that doesn’t fit.

2. Which two factors control the number of cycles in fatigue life?

A. Temperature and humidity

B. ADTT and n

C. Material grade and weld size

D. Cross-section area and yield strength

Fatigue life is set by how much cyclic stress the member endures at the critical section and how well the material can resist that stress over time. The cross-sectional area at the weakest section determines the stress produced by a given load (stress = load divided by area). A larger area lowers the stress, so more cycles are needed before cracks grow to a critical size; a smaller area raises stress and shortens the cycle count to failure. The material’s yield strength indicates the stress level the material can withstand before it deforms plastically, which accelerates crack initiation and growth if exceeded. A higher yield strength means the component can tolerate higher cyclic stresses before damage progresses, increasing the number of cycles before failure. These two factors—the stress incurred at the section and the material’s resistance to that stress—primarily govern the fatigue life in this context. In real-world scenarios other factors like environment, surface finish, and weld details influence fatigue, but the combination of area and yield strength directly sets the capacity against cyclic loading.

3. Which failure type is linked to T1 steel butt welds according to the notes?

A. Rivet hole filled with wellment started a crack

B. Impact damage

C. Overloaded gusset plates

D. T1 steel butt weld failure

The key idea is that weld-related failure is the mode associated with T1 steel butt welds. The notes specifically call out a failure type tied to T1 butt welds, meaning when you see cracking or failure occurring at the butt welds of T1 steel members, it’s categorized as T1 steel butt weld failure. This reflects how this material and joint type can fail at the weld itself or the heat-affected zone due to welding quality, residual stresses, or material properties. Other listed possibilities describe different failure mechanisms (for example, crack initiation from a rivet hole filled with material, general impact damage, or failures from overloading gusset plates) and do not match the weld-specific failure noted for T1 butt joints.

4. Which property best describes the ability to absorb energy before fracturing?

A. Ductility

B. Hardness

C. Toughness

D. Brittleness

Toughness describes how much energy a material can absorb before it fractures. It captures the material’s ability to resist crack initiation and to slow crack growth as it deforms, letting it dissipate more energy prior to failure. In mechanical terms, toughness is the area under the stress-strain curve up to fracture, and it’s often assessed with impact tests that measure energy to fracture. This matters for bridges because components must absorb energy from dynamic or accidental loads without sudden, catastrophic failure. Ductility is about how far a material can plastically deform before breaking, which is related but does not directly quantify energy absorption. Hardness is resistance to surface indentation, and brittleness means fracture with little plastic deformation and low energy absorption. So, the property that best describes the ability to absorb energy before fracturing is toughness.

5. Which fatigue stage is described as unstable?

A. Initiation

B. Propagation

C. Failure

D. All stages are unstable

In fatigue, crack development occurs in stages: initiation, where small cracks form at stress concentrators; propagation, where the crack grows with cycles; and failure, where the crack reaches a critical size and the remaining section can no longer carry the load. The unstable stage is the final failure because once the crack is large enough, the remaining material cannot support the applied stresses, causing rapid, uncontrolled fracture with little warning. Initiation and propagation involve crack growth that is relatively gradual and predictable, whereas failure is the abrupt, unstable collapse of the member.

6. Which property is a measure of how steel resists permanent deformation under load?

A. Ductility

B. Elastic Modulus

C. Yield Strength

D. Toughness

Understanding how steel behaves under load starts with the idea of elastic versus plastic deformation. The property that marks the onset of permanent, non-recoverable deformation is the yield strength—the stress level at which steel begins to yield and deform plastically. This is why it best measures resistance to permanent deformation: a higher yield strength means the material can carry more load before any irreversible distortion remains after unloading. Ductility describes how much plastic deformation the material can undergo before fracture, not when permanent deformation starts. Elastic modulus tells you stiffness and the amount of elastic strain before yielding, but it doesn't define permanent deformation. Toughness measures the total energy a material can absorb before fracture, combining strength and ductility, not specifically the onset of permanent deformation. In practice, keeping service stresses below the yield strength helps prevent long-term distortions in bridges and other steel structures.

7. Which statement accurately describes brittle fracture?

A. No warning prior to failure; sudden

B. Requires large plastic deformation before failure

C. Occurs at high temperatures with necking

D. Brittle fractures lack warning but that's not always; no clear sign before failure

Brittle fracture is defined by a sudden break with little or no plastic deformation before failure, so there is essentially no warning before the part breaks. Once cracks initiate, they propagate rapidly, and yielding or necking is minimal or absent, leading to an abrupt failure. This is why the statement describing no warning prior to failure and a sudden break best fits brittle behavior. The other descriptions point to ductile fracture, where noticeable plastic deformation or necking occurs before failure, typically under higher temperatures or slower loading, which is not characteristic of brittle fracture. While real materials can show variations, the classic description emphasizes the abrupt nature and lack of prior warning.

8. Which issue was observed on the I-276 Delaware River-Turnpike Toll Bridge?

A. T1 steel butt weld failure

B. Impact damage

C. Overloaded gusset plates

D. Rivet hole filled with wellment started a crack

Cracking in steel bridge connections often starts at a stress concentration, such as a rivet hole, especially when that hole has been altered by filler material. In this scenario, the rivet hole was filled with a substance described as wellment. Filling a rivet hole can trap moisture, create a mismatch in material properties, and introduce a rough interface around the hole. Under repeated traffic loading, this local irregularity becomes a fatigue crack initiation site and can propagate from the edge of the filled hole into the surrounding steel. So, the observed issue on the I-276 Delaware River-Turnpike Toll Bridge fits a fatigue-crack scenario initiated at a rivet hole that had been filled with filler material. This is why it's the best choice: it points to a specific, crack-related problem tied to a rivet-hole modification, rather than to a broad or different failure mode like butt-weld issues, impact damage, or gusset overload, which would present differently in inspection findings. In practice, this would lead to targeted inspection of riveted connections, assessment of the filler's suitability, and repair actions to remove the filler or repair the affected area to restore proper detailing and remove the crack initiation point.

9. What safety issues are associated with confined spaces?

A. Lack of Oxygen, Toxic Gas, Darkness

B. Open air and wind

C. Adequate oxygen and bright light

D. No safety issues

Confined spaces bring hazards because they have limited ventilation and often contain unknown air quality. The primary safety issues are that oxygen levels can drop, toxic or flammable gases can build up, and visibility inside the space can be poor or completely dark. Lack of oxygen means there isn't enough breathable air, which can lead to dizziness, unconsciousness, or death, especially if a worker is working without noticing the change in air. Toxic gases can accumulate from decaying materials, chemical processes, or prior work in the space, posing poisoning or explosion risks. Darkness or very low visibility makes it easy to trip, misjudge the space, or miss warning signs of hazards, and it can hinder quick evacuation if needed. The other options describe conditions that would reduce risk or are not hazards in themselves—open air and wind improve ventilation, adequate oxygen and bright light indicate a safe environment, and no safety issues ignores the inherent risks of confined spaces.

10. Distortion Induced Fatigue results from what type of forces?

A. Primary bending forces

B. Secondary forces

C. Torsional loads

D. Thermal expansion

Distortion Induced Fatigue comes from forces that are not the main load path, but instead cause the member to distort as it cycles with traffic. These secondary forces—such as restraint, misalignment, fabrication/erection tolerances, residual stresses from welding, and temperature effects—induce small, repeated shape changes. That distortion changes the local stress field at connections and weld details, so the crack growth is driven by these distortion-driven stress reversals rather than just the primary bending moment. Over many cycles, that distortion-induced alternating stress concentrates at weld toes and other detail knots, leading to fatigue cracks. Primary bending forces drive the overall flexing of a member, but distortion-induced fatigue specifically hinges on those secondary forces that distort the member and alter the stress state at connections. Torsional loads and thermal effects can cause distortion as well, but the mechanism of fatigue here is tied to secondary forces causing distortion, not to a pure torsional fatigue mode or to thermal effects alone.

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://fhwanhi22079130078.examzify.com

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