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

Study Guide

Everything you need from our exam experts!

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. Ductile failure is characterized by which of the following?

A. It is sudden and without any plastic deformation

B. Preceded by local plastic deformation, with shear lips

C. Occurs with necking but no plastic deformation

D. Requires low temperature to occur

2. Load path redundancy requires how many members?

A. Two members

B. 3+ members

C. One member

D. Four or more members

3. In the source's fatigue susceptibility ranking, which bridge is listed first (least susceptible)?

A. Mianus River Bridge

B. Silver Bridge

C. Daniel W. Hoan Bridge

D. Eye Bolt Failure

4. What are the three stages of fatigue failure?

A. Initiation (assumed from start), propagation (stable) and failure (unstable)

B. Crack appearance, growth, final fracture

C. Damage accumulation, crack lengthening, break

D. Initiation, propagation, and failure

5. Which statement lists the three primary factors of fatigue life?

A. Stress range, Number of cycles and Detail type

B. Temp, Pressure, Humidity

C. Crack length, Growth rate, Material type

D. Amplitude, Frequency, Surface finish

6. Intersecting Welds are defined as welds that intersect or come within what distance of another intersection?

A. 0.125 inches

B. 0.5 inches

C. 1 inch

D. 0.25 inches

7. Weld Quality Issues

A. Porosity, Spatter, Under cutting, cratering

B. Surface roughness only

C. Color change

D. Nonmetallic inclusions only

8. Which are common steel defects?

A. Cracking, Section Loss, Distortion, Overload, Strength Loss

B. No defects exist in steel

C. Rust only

D. Dents and scratches

9. NBIS requires that inspections be conducted within what timeframe after opening to traffic?

A. 12 months

B. 6 months

C. 24 months

D. 36 months

10. Which two strength values are commonly cited for steel indicating the limits before plastic flow and fracture?

A. Elastic Modulus and Shear Strength

B. Hardness and Toughness

C. Fatigue Limit and Creep Strength

D. Yield Strength and Ultimate Tensile Strength

Answers

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

Explanations

1. Ductile failure is characterized by which of the following?

A. It is sudden and without any plastic deformation

B. Preceded by local plastic deformation, with shear lips

C. Occurs with necking but no plastic deformation

D. Requires low temperature to occur

Ductile failure happens after the material has undergone substantial plastic deformation. In a typical tensile-like loading, you'll see necking where the cross-section reduces and the material stretches significantly before breaking. The fracture surface often shows shear lips—areas of localized plastic shear around the neck—along with a cup-and-cone or dimpling appearance from micro-void coalescence. This combination—local plastic deformation followed by fracture with shear lips—is what identifies ductile failure. That's why the description of being preceded by local plastic deformation, with shear lips, is the best fit. The other options describe brittle behavior (sudden fracture with little plasticity), a contradiction (necking without plastic deformation), or a condition (low temperature) that can influence whether a material is ductile or brittle but isn't what defines ductile failure itself.

2. Load path redundancy requires how many members?

A. Two members

B. 3+ members

C. One member

D. Four or more members

Load path redundancy means there are multiple independent routes for load to reach the supports, so the structure can still carry the load if a member is damaged. The minimum to achieve this is three or more members along the load path. With only two members, losing one member can leave a single path that may not be able to carry the load safely, giving little or no alternate route. Having three or more members provides at least two remaining paths to share the load if one member is compromised, maintaining capacity and safety. Four or more offers even more robustness, but the required minimum for redundancy is three or more.

3. In the source's fatigue susceptibility ranking, which bridge is listed first (least susceptible)?

A. Mianus River Bridge

B. Silver Bridge

C. Daniel W. Hoan Bridge

D. Eye Bolt Failure

Understanding fatigue susceptibility in this context means looking at how the source evaluates different bridge details and their tendency to develop and propagate fatigue cracks under repeated loading, not just past incidents. The ranking is built from how design features, connection types, and maintenance history influence crack initiation and growth. In that framework, the Silver Bridge is listed first as the least susceptible. This framing implies that, compared to the other items, its particular design details and the way fatigue would manifest under typical service loads are deemed less prone to progressive fatigue cracking according to the source's criteria. The other options involve features that are more commonly associated with fatigue-prone behavior—such as specific connections or failure modes that have a clearer track record of fatigue issues—so they rank above the Silver Bridge in terms of susceptibility. So, within the source's scoring, the Silver Bridge stands as the least susceptible, making it the correct choice.

4. What are the three stages of fatigue failure?

A. Initiation (assumed from start), propagation (stable) and failure (unstable)

B. Crack appearance, growth, final fracture

C. Damage accumulation, crack lengthening, break

D. Initiation, propagation, and failure

Fatigue failure happens in three stages: initiation, propagation, and final fracture. First, tiny cracks form at stress concentrators such as weld toes, sharp corners, or surface irregularities after many load cycles. Then these cracks grow with continued cyclic loading; the growth rate depends on the stress range, material, and environment, often starting slowly and accelerating as the crack enlarges. Finally, when the crack reaches a critical size, the remaining ligament can no longer carry the applied load, leading to rapid, final fracture. This sequence is the standard way engineers describe fatigue life, and it helps explain why bridges may fail suddenly after many cycles even if the load at any one moment seems small.

5. Which statement lists the three primary factors of fatigue life?

A. Stress range, Number of cycles and Detail type

B. Temp, Pressure, Humidity

C. Crack length, Growth rate, Material type

D. Amplitude, Frequency, Surface finish

Fatigue life is controlled by how severe the cyclic loading is, how many load cycles the member experiences, and how the part's geometry concentrates stress. The higher the stress range, the fewer cycles you can endure before a crack initiates and grows to failure; more cycles generally mean more fatigue life unless the stress is reduced. The detail type—things like sharp corners, holes, weld toes, or abrupt changes in section—shapes local stress concentrations and notch sensitivity, which can dramatically shorten life even at moderate stress ranges. While environment, crack growth, or material properties play important roles, they don't define the fundamental trio that governs fatigue life: stress range, number of cycles, and detailing that governs stress concentration.

6. Intersecting Welds are defined as welds that intersect or come within what distance of another intersection?

A. 0.125 inches

B. 0.5 inches

C. 1 inch

D. 0.25 inches

Intersecting welds are defined by how close weld lines come to each other. If two welds cross or are within a very small gap of each other, they are treated as intersecting because their heat-affected zones and weld geometry can influence one another and affect how defects are detected and repaired. The standard threshold used is 0.25 inches. So when two welds intersect or their closest points are within a quarter inch, they're considered intersecting, and they're evaluated as a combined region for inspection purposes. This 0.25-inch limit keeps the assessment practical and consistent: if you used a smaller distance, many welds that effectively interact would be missed; if you used a larger distance, welds that are clearly separate would be grouped together.

7. Weld Quality Issues

A. Porosity, Spatter, Under cutting, cratering

B. Surface roughness only

C. Color change

D. Nonmetallic inclusions only

Weld quality issues are defects that weaken a weld joint and shorten its service life. The best option covers several of the most common defects that inspectors routinely look for: porosity, spatter, undercut, and cratering. Porosity means gas is trapped in the molten metal, creating voids that reduce strength and can initiate cracks; it's typically caused by moisture, contaminants, or inadequate shielding. Spatter refers to small metal droplets expelled during welding that land on surrounding surfaces, revealing arc stability problems or improper parameters and complicating inspection or corrosion resistance. Undercutting is a groove along the weld toe where the base metal is melted away, thinning the joint and creating a stress concentration that promotes fatigue failure. Cratering occurs at the end of a weld when the pool solidifies too quickly, leaving a crater that can crack if not properly filled or cooled, especially in thicker sections. Other options describe a single symptom or defect type rather than a broad set of common weld quality issues. Surface roughness measures how the finish looks, but a weld can be functionally deficient even if roughness isn't severe. Color change signals overheating or oxidation, but doesn't capture the range of weld defects. Nonmetallic inclusions are just one internal defect type among many; they don't represent the broad category of weld quality issues.

8. Which are common steel defects?

A. Cracking, Section Loss, Distortion, Overload, Strength Loss

B. No defects exist in steel

C. Rust only

D. Dents and scratches

On inspection, the most common steel defects are surface dents and scratches. Dents come from impacts or mishandling and can locally deform the member, potentially changing how it carries load if they're large. Scratches damage the protective coating and expose bare steel, which accelerates corrosion. While other conditions like cracking, section loss, distortion, overload, or overall strength decrease indicate more severe problems, they're not as routinely observed as everyday surface flaws. Rust is a form of corrosion, but it's not the only common defect, and saying there are no defects at all is incorrect. Dents and scratches best capture the typical, everyday defects you're likely to encounter on steel members.

9. NBIS requires that inspections be conducted within what timeframe after opening to traffic?

A. 12 months

B. 6 months

C. 24 months

D. 36 months

When a bridge first opens to traffic, an initial inspection must be completed within 12 months to establish a baseline condition. This early check catches any construction or early-service issues and provides a reference point for tracking changes over time. After this baseline, routine NBIS inspections follow a two-year cycle, conducted at least every 24 months. So, the 12-month timeframe is the correct window for the first inspection, with 24 months later being the regular cadence. The other timeframes don't fit the established sequence for the initial versus ongoing inspections.

10. Which two strength values are commonly cited for steel indicating the limits before plastic flow and fracture?

A. Elastic Modulus and Shear Strength

B. Hardness and Toughness

C. Fatigue Limit and Creep Strength

D. Yield Strength and Ultimate Tensile Strength

In steel, two strength values are routinely cited to describe the limits of how much load the material can carry before it behaves plastically or fails. The first is the yield strength, which marks the onset of plastic deformation. Up to this stress, the material responds elastically and will return to its original shape when the load is removed; beyond it, permanent (plastic) deformation starts. The second is the ultimate tensile strength, the highest stress the material can withstand in a tensile test. It represents the maximum load-carrying capacity; after reaching this point, the steel typically necks and eventually fractures. These two values are fundamental for design: ensure operating stresses stay below yield strength to avoid permanent deformation, and use the ultimate tensile strength as a measure of the material's overall strength before failure. Other options don't fit because they describe different properties. Elastic modulus relates to stiffness, not the onset of plastic flow. Hardness and toughness measure surface resistance to indentation and energy to fracture, respectively, but not the two standard tensile thresholds. Fatigue limit and creep strength pertain to cyclic loading and long-term high-temperature behavior, not the basic monotonic yield and fracture limits.

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!