Civil Engineering – Bridge Structures, Materials, and Design Principles (J-R) Practice Test (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 code is published by the Ontario Ministry of Transportation for bridge design?**

   A. Operating Rating

   B. Orthotropic Deck

   C. Overlay

   D. OHBDC - Ontario Highway Bridge Design Code

2. **Which term is used to describe the axis of a bridge that runs from abutment to abutment?**

   A. Maintenance

   B. Longitudinal

   C. Luminaire

   D. Local Buckling

3. **Which term refers to a joint that allows very large movements consisting of multiple strip or compression seals?**

   A. Masonry Plate

   B. Nail Laminated

   C. Military Loading

   D. Modular Joint

4. **An arch-type bridge constructed with steel beams encased in concrete is called what?**

   A. Cantilever

   B. Jack Arch

   C. Through Arch

   D. Suspension

5. **Which term is a drawing that presents both the roadway plan view along with its profile on the same sheet and at equal horizontal scales?**

   A. Plan and Profile

   B. Plan

   C. Planimetry

   D. Plinth

6. What term refers to broken rock placed around piers and abutments to prevent erosion and scour?

A. Gabions

B. Ballast

C. Rip Rap

D. Sag

7. Which term refers to the facing on the water-facing side of a pier?

A. Overlay

B. On the Overpass

C. Nosing

D. OHBDC

8. What describes a vertical curve formed by a downward tangent followed by an upward tangent?

A. Sag

B. Crest

C. Dip

D. Curve

9. The load capacity of a bridge under special service conditions is known as what?

A. Operating Rating

B. Negative Moment

C. Nosing

D. On the Overpass

10. A long section of metal or wood dragged across freshly placed concrete to smooth the surface and consolidate the concrete is called?

A. Float

B. Trowel

C. Finisher

D. Screed

Answers

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

Explanations

1. Which code is published by the Ontario Ministry of Transportation for bridge design?

A. Operating Rating

B. Orthotropic Deck

C. Overlay

D. OHBDC - Ontario Highway Bridge Design Code

The code published by the Ontario Ministry of Transportation for bridge design is the Ontario Highway Bridge Design Code. This document sets the official requirements for designing highway bridges in Ontario, covering aspects like load models, materials, detailing, analysis methods, and safety criteria. It ensures consistency and safety across bridge projects in the province. The other terms refer to concepts or features (a load rating, a type of deck, or an overlay) rather than the designated design code itself.

2. Which term is used to describe the axis of a bridge that runs from abutment to abutment?

A. Maintenance

B. Longitudinal

C. Luminaire

D. Local Buckling

In bridge terminology, directions are described along the longitudinal, transverse, and vertical axes. The axis that runs from one abutment to the other follows the length of the bridge span, so it's the longitudinal axis. This lengthwise direction is where the primary bending and shear effects from loads along the span are analyzed, and it contrasts with the transverse direction, which goes across the bridge, and the vertical axis, which is up and down. The other terms here don't describe an axis: maintenance is about keeping the structure in service, luminaire refers to lighting, and local buckling is a failure mode of slender plates or members. So the axis from abutment to abutment is the longitudinal axis.

3. Which term refers to a joint that allows very large movements consisting of multiple strip or compression seals?

A. Masonry Plate

B. Nail Laminated

C. Military Loading

D. Modular Joint

Expansion joints for bridges are chosen by how much movement they must accommodate. When very large movements are required, a modular joint is used. It is made up of a series of modular elements that fit into a track, with seals between the modules. As the deck expands or contracts, the modules slide within their frames, while multiple strip seals or compression seals between the modules maintain a watertight barrier. This modular setup can be extended by adding more modules to handle greater displacement, which is why it's suited for long spans with large movement demands. The other terms refer to different concepts (construction methods or loading conditions) and do not describe a joint system for large movements.

4. An arch-type bridge constructed with steel beams encased in concrete is called what?

A. Cantilever

B. Jack Arch

C. Through Arch

D. Suspension

This type of arch bridge relies on an arch action created by encasing steel members in concrete. Steel beams form the structural ribs, and the surrounding concrete turns those ribs into a single arch that carries the load in compression, with the deck typically supported on top or integrated into the arch section. The result is a shallow, arch-like span that behaves like a concrete-encased steel arch. This fits the description because the other options describe different bridge concepts: a cantilever bridge uses projecting arms that extend from piers and meet in the middle without a true arch formed by encased members; a through-arch bridge has the arch rising above the deck and traffic passing between the legs of the arch; a suspension bridge carries the deck on cables hung from towers.

5. Which term is a drawing that presents both the roadway plan view along with its profile on the same sheet and at equal horizontal scales?

A. Plan and Profile

B. Plan

C. Planimetry

D. Plinth

In highway design drawings, a plan and profile sheet combines two essential views on one page: the roadway's plan view, which shows the horizontal alignment from above, and the profile, which shows the vertical alignment along the route. Presenting them at equal horizontal scales means the horizontal distances match exactly between the two views, so where a feature sits in plan lines up with its elevation along the profile. This pairing lets engineers assess how the road's path and grades interact, check sight distances, determine grades and curvature together, and ensure the design is coherent along the alignment. The term that describes this combined drawing is plan and profile. A plan alone covers only the top-down layout, planimetry refers more generally to the mapped positions in two dimensions, and plinth is unrelated to road drawings.

6. What term refers to broken rock placed around piers and abutments to prevent erosion and scour?

A. Gabions

B. Ballast

C. Rip Rap

D. Sag

Protecting pier foundations from erosion and scour is achieved with riprap—the layer of broken rock placed around bases to shield them from flowing water and prevent displacement of soil at the substrate. Riprap works by dissipating hydraulic energy and increasing bed roughness, which reduces near-base flow velocity and shields the concrete or hollow piers and abutments from scour channels developing at the foundation. The stones are typically angular so they interlock and resist movement, and their size and thickness are chosen based on the expected flow velocity, scour depth, and site conditions. Sometimes a toe protection and a graded, layered arrangement are used to ensure stability and long-term performance. Gabions are wire cages filled with rock and serve a similar protective purpose but in modular units; ballast refers to coarse rock used to support and stabilize structures like railway beds; sag isn't a standard term for this application.

7. Which term refers to the facing on the water-facing side of a pier?

A. Overlay

B. On the Overpass

C. Nosing

D. OHBDC

The term describing the facing on the water-facing side of a pier is nosing. This refers to the exposed edge or boundary on the water side of the structure—the visible face that meets the water. Nosing is used to provide a protective, wear-resistant boundary where waves, debris, and ice interact with the pier, helping to minimize damage to the main face and to define the water interface clearly. The other options describe surface treatments or unrelated features, so they don't fit as the water-facing edge.

8. What describes a vertical curve formed by a downward tangent followed by an upward tangent?

A. Sag

B. Crest

C. Dip

D. Curve

Vertical curves are used to smoothly connect two different grades in a grade profile. When the road goes from a downward slope to an upward slope, the profile forms a valley, bending downward first and then upward. This shape is called a sag vertical curve, indicating a dip in the profile. It's the opposite of a crest vertical curve, which occurs when the grade changes from up to down and produces a peak. A generic term like "curve" doesn't specify the valley shape, and while some may call it a dip, the standard term used in design is sag.

9. The load capacity of a bridge under special service conditions is known as what?

A. Operating Rating

B. Negative Moment

C. Nosing

D. On the Overpass

The idea being tested is how we describe a bridge's ability to carry traffic under real-world conditions. That capacity under service conditions is called the operating rating. It reflects the maximum live load the bridge can carry in its current state without exceeding allowable service stresses or compromising serviceability (like excessive deflections, vibrations, or wear). It's distinct from ultimate strength concepts used in design, and it applies to everyday use rather than theoretical failure loads. The other terms don't fit this idea: a negative moment is a bending moment value at a support, not a measure of how much load the bridge can carry in service; nosing is a feature term related to edge projections on stairs or pilings, not a rating; and "on the overpass" isn't a technical term in bridge load rating.

10. A long section of metal or wood dragged across freshly placed concrete to smooth the surface and consolidate the concrete is called?

A. Float

B. Trowel

C. Finisher

D. Screed

Dragging a long straightedge across freshly poured concrete is the screed. Its job is to bring the surface to a true plane by striking off the excess material and establishing the correct thickness, which also helps consolidate the mix as the concrete is leveled. After screeding, later finishing steps use a float to smooth the surface and a trowel for the final finish. A finisher is the person who does the work, not the tool itself. The key idea is that the screed is the long straightedge used to level and consolidate the fresh concrete.

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://cebridgestructuresmaterialsdesign.examzify.com

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