PSAD CIVIL ENGINEERING LICENSURE EXAMINATION (CELE) PRACTICE TEST (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

VISIT US ONLINE FOR THE FULL VERSION STUDY GUIDE

https://psadcele.examzify.com

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. In contract administration, what is the purpose of a change order?

A. To Document and Authorize Changes in Scope, Cost, or Schedule Agreed by the Parties

B. To Terminate the Contract

C. To Assign a New Contractor

D. To Increase Payment Without Change in Scope

2. Area of compression steel As' is calculated by which formula?

A. As' = As2 fy /(f's - 0.85 f'c)

B. As' = As2 fy /(f's - 0.75 f'c)

C. As' = (f's - 0.85 f'c)/(As2 fy)

D. As' = As2 fy /(f's + 0.85 f'c)

3. Deformation delta under axial load is given by which formula?

A. delta = P / (A E)

B. delta = P L / (A E) * L

C. delta = P L^2 / (A E)

D. delta = P L / (A E)

4. Angle of twist for a shaft is θ = TL / (J G) in radians. Given T = 80 N·m, L = 0.8 m, J = 1.2×10^-5 m^4, and G = 30 GPa, compute θ in radians.

A. 1.77e-3 rad

B. 1.78e-4 rad

C. 1.78e-5 rad

D. 1.78e-2 rad

5. In the steel ratio expressions, what does β1 represent?

A. A factor accounting for the effect of concrete strength on reinforcement ratio

B. The yield strength of steel

C. A factor for ductility

D. A geometric ratio of concrete cover

6. In civil engineering economics, what does the time value of money principle imply for project evaluation?

A. Future costs and benefits are evaluated in nominal terms only.

B. Future costs and benefits are discounted to present value to compare alternatives.

C. Time value of money is irrelevant for long-term projects.

D. Only initial costs determine project viability.

7. In contract law, what is liquidated damages?

A. Damages awarded after a court award for breach.

B. Pre-estimated damages specified in the contract for delay or breach.

C. Punitive damages assessed for intentional harm.

D. Damages determined by expert appraisers after breach.

8. In Balanced Strain Condition, which relationships hold between steel stress and steel strain?

A. fs = 0 and εs = εty

B. fs = fy and εs = εty

C. fs = fy and εs = εt

D. fs = fy and εs = εtyd

9. In open-channel hydraulics, the hydraulic radius is defined as A divided by P. If the cross-sectional area A becomes four times larger while the Wetted Perimeter P stays the same, what happens to the hydraulic radius?

A. Decreases

B. Stays the Same

C. Increases by a Factor of Four

D. Increases by a Factor of Two

10. The first moment of area Q about the neutral axis is given by which expression?

A. Q = Ay

B. Q = A y^2

C. Q = A / y

D. Q = A y^3

Answers

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

Explanations

1. In contract administration, what is the purpose of a change order?

A. To Document and Authorize Changes in Scope, Cost, or Schedule Agreed by the Parties

B. To Terminate the Contract

C. To Assign a New Contractor

D. To Increase Payment Without Change in Scope

When a project needs alterations after the contract is signed, a change order serves as the formal instrument to record and authorize those modifications. It captures exactly what is changing in the work, how much extra (or less) it will cost, and how the project timeline will be affected, with approval from the parties involved. This creates a clear, auditable record so everyone understands the new scope, price, and schedule, and it ensures payment and scheduling adjustments are made only with mutual agreement. In practice, a change order documents the changed scope, any revised quantities or unit prices, and the revised completion date, tying everything back to the original contract terms.

2. Area of compression steel As' is calculated by which formula?

A. As' = As2 fy /(f's - 0.85 f'c)

B. As' = As2 fy /(f's - 0.75 f'c)

C. As' = (f's - 0.85 f'c)/(As2 fy)

D. As' = As2 fy /(f's + 0.85 f'c)

In reinforced concrete design with both tension and compression reinforcement, the forces on the section must balance at ultimate. The tension reinforcement at the bottom carries a force equal to As2 times the steel yield strength fy. To maintain equilibrium, the compression side provides resistance through both the compression reinforcement (As' times f's) and the concrete in compression (about 0.85 f'c, the design value for concrete's compressive strength). Solving the force balance for the required area of compression reinforcement yields As' = As2 fy /(f's - 0.85 f'c). Here, the numerator represents the tensile force that must be resisted, and the denominator captures the net available compression capacity per unit area (the difference between the compression steel stress and the concrete's design compressive stress). This is why that particular form is used: it directly ties As' to the tension reinforcement, steel strength, and the effective concrete strength. The other forms misrepresent the force balance or use incorrect signs or coefficients, so they don't reflect the way the internal forces balance in such sections.

3. Deformation delta under axial load is given by which formula?

A. delta = P / (A E)

B. delta = P L / (A E) * L

C. delta = P L^2 / (A E)

D. delta = P L / (A E)

*When a straight bar is pulled axially, its elongation depends on the load, the bar's length, cross-sectional area, and the material's stiffness. The axial strain is epsilon = P/(A E). The total deformation is the strain times the length, giving delta = (P/(A E)) * L = P L /(A E). This matches the standard formula for axial deformation. The form that only has P/(A E) would be a strain, not a length of deformation, and the forms with extra L (such as P L^2 /(A E)) would not have the correct units for a displacement.*

4. Angle of twist for a shaft is θ = TL / (J G) in radians. Given T = 80 N·m, L = 0.8 m, J = 1.2×10^-5 m^4, and G = 30 GPa, compute θ in radians.

A. 1.77e-3 rad

B. 1.78e-4 rad

C. 1.78e-5 rad

D. 1.78e-2 rad

The quantity tested is how torsion relates torque, length, polar moment, and shear modulus. For a shaft under torsion, the angle of twist is θ = TL/(JG). Here JG combines the shaft's geometry with its material stiffness, and the result must be dimensionless (radians). Compute step by step: T times L is 80 × 0.8 = 64 N·m^2. The product JG is (1.2×10^-5 m^4) × (30×10^9 N/m^2) = 3.6×10^5 N·m^2. The ratio gives θ = 64 / 3.6×10^5 ≈ 1.78×10^-4 radians. Thus the angle of twist is about 1.78×10^-4 radians, which matches the given correct value.

5. In the steel ratio expressions, what does β1 represent?

A. A factor accounting for the effect of concrete strength on reinforcement ratio

B. The yield strength of steel

C. A factor for ductility

D. A geometric ratio of concrete cover

β1 is the factor that defines the depth of the equivalent rectangular compression stress block used in concrete in flexural design. It captures how the strength of concrete (fc') influences the distribution of compressive stress and, by changing the block depth, affects the neutral axis location and the lever arm, which in turn influences how much reinforcement is needed to reach the target moment capacity. It varies with fc', typically decreasing as fc' increases, and is not a property of the steel itself, such as yield strength or ductility, nor a geometric ratio of concrete cover. In this sense, it embodies the influence of concrete strength on the reinforcement ratio.

6. In civil engineering economics, what does the time value of money principle imply for project evaluation?

A. Future costs and benefits are evaluated in nominal terms only.

B. Future costs and benefits are discounted to present value to compare alternatives.

C. Time value of money is irrelevant for long-term projects.

D. Only initial costs determine project viability.

Money has a time value: today's dollar can be invested to earn a return, so it is worth more than the same amount received in the future. In civil engineering economics, this means you don't compare future costs and benefits at their face values. Instead, you discount them back to present value using a discount rate that reflects the opportunity cost of capital, inflation, and risk. By converting all cash flows to present value, you can compare alternatives on a common basis. The usual goal is to see whether the sum of the present values of benefits exceeds the present value of costs (net present value). If the net present value is positive, the project is considered financially attractive because it adds value today. This approach highlights why time matters for long term projects: ignoring the time value can bias decisions toward options with larger early cash flows or overlook benefits realized far in the future. It also shows that future costs and benefits matter, not just the initial investment.

7. In contract law, what is liquidated damages?

A. Damages awarded after a court award for breach.

B. Pre-estimated damages specified in the contract for delay or breach.

C. Punitive damages assessed for intentional harm.

D. Damages determined by expert appraisers after breach.

Liquidated damages are a fixed sum, written into a contract, that one party agrees to pay the other if there is a breach or delay. This concept is used when the actual amount of losses would be hard to determine or prove, so the contract sets a pre-estimated amount to provide certainty and speed up resolution if something goes wrong. For liquidated damages to be enforceable, the amount should be a reasonable forecast of the potential harm at the time the contract is formed; if it's designed as a penalty or is grossly excessive, a court may not enforce it. They are not simply damages awarded after a breach based on actual losses, nor are they punitive damages intended to punish misconduct, nor are they necessarily determined by post-breach appraisal unless the contract specifically uses that mechanism for assessing damages.

8. In Balanced Strain Condition, which relationships hold between steel stress and steel strain?

A. $f_s = 0$ and $\varepsilon_s = \varepsilon_{ty}$

B. $f_s = f_y$ and $\varepsilon_s = \varepsilon_{ty}$

C. $f_s = f_y$ and $\varepsilon_s = \varepsilon_t$

D. $f_s = f_y$ and $\varepsilon_s = \varepsilon_{tyd}$

Balanced strain condition means the steel reaches its yield point at the same time the concrete reaches its maximum usable compressive strain, so neither material governs the failure first. At that moment, the steel has yielded, so its stress is the yield strength f_y, and its strain is the yield strain ε_{ty} (which equals f_y/E_s for steel in the elastic range up to yield). Therefore f_s equals f_y and ε_s equals ε_{ty}. This simultaneous attainment of yield in the steel and limiting strain in the concrete defines the balanced state.

9. In open-channel hydraulics, the hydraulic radius is defined as A divided by P. If the cross-sectional area A becomes four times larger while the Wetted Perimeter P stays the same, what happens to the hydraulic radius?

A. Decreases

B. Stays the Same

C. Increases by a Factor of Four

D. Increases by a Factor of Two

The hydraulic radius is the cross-sectional area A divided by the wetted perimeter P. If the area grows by a factor of four while the wetted perimeter remains unchanged, the ratio becomes four times larger: R_h new = $(4A)/P = 4(A/P)$. So the hydraulic radius increases by a factor of four. Intuitively, increasing the flow area without increasing the boundary length makes the boundary's influence on the flow smaller relative to the area.

10. The first moment of area Q about the neutral axis is given by which expression?

A. Q = Ay

B. Q = A y^2

C. Q = A / y

D. Q = A y^3

The first moment of area about an axis is defined as Q = ∫ y dA, where y is the distance from the neutral axis to each differential area dA. This quantity tells us how the cross-section's area is distributed relative to the neutral axis and is key in deriving shear stress distributions in beams. If you take a small strip of area A located a distance y from the neutral axis, every part of that strip is at the same distance y, so its contribution to the first moment is simply y times the strip's area: Q = A·y. This is the simplest way to express Q for that portion, and it generalizes to any portion of area with area A situated at distance y from the neutral axis, where Q = ∫ y dA. The other forms would not have the correct units or interpretation for the first moment of area, since Q involves area times distance, not distance alone squared or inverse.

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://psadcele.examzify.com

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