

GERTC Principles of Surveying, Analysis, and Design (PSAD) 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

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- 1. Ground displacement is primarily measured by which instrument?**
 - A. Accelerometer**
 - B. Seismometer**
 - C. Transducer**
 - D. Strain Gauge**

- 2. Which property best describes an isotropic material?**
 - A. Consistent properties in all directions**
 - B. Variable properties based on direction**
 - C. Only elastic properties**
 - D. Materials that do not change shape**

- 3. What does coordinate geometry (COGO) involve in surveying?**
 - A. Calculating the area of land parcels**
 - B. Mathematical calculations of geometric dimensions and positions**
 - C. Measuring terrain slopes and elevations**
 - D. Creating graphical representations of survey data**

- 4. Which of the following best defines a soft storey?**
 - A. It has more than 80% strength compared to the storey above**
 - B. It has less than 70% stiffness compared to the story above**
 - C. It is equal to the average stiffness of the storeys above**
 - D. It features uniform strength across all storeys**

- 5. Which of the following describes the proportional relationship between stress and strain in materials?**
 - A. Stress-Strain Modulus**
 - B. Elastic Modulus**
 - C. Young's Modulus**
 - D. Compressibility**

- 6. Which term refers to the capability of a material to withstand deformation and absorb energy before reaching failure?**
- A. Toughness**
 - B. Elasticity**
 - C. Resilience**
 - D. Relaxation**
- 7. What best describes the reciprocal relationship to stiffness in structural engineering?**
- A. Elasticity**
 - B. Flexibility**
 - C. Deflection**
 - D. Rigidity**
- 8. What does the term resilience refer to in material properties?**
- A. Ability to absorb energy without exceeding elastic limits**
 - B. Ability to deform plastically before rupture**
 - C. Ability to withstand tensile stress**
 - D. Ability to break under compressive load**
- 9. What principle states that stress is proportional to strain within the elastic region?**
- A. Boyle's Law**
 - B. Hooke's Law**
 - C. Newton's Law**
 - D. Bernoulli's Principle**
- 10. What does "azimuth" measure in surveying?**
- A. The elevation of a point**
 - B. The distance from one point to another**
 - C. The angle between a reference direction and a point**
 - D. The area of land surveyed**

Answers

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

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Explanations

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1. Ground displacement is primarily measured by which instrument?

- A. Accelerometer**
- B. Seismometer**
- C. Transducer**
- D. Strain Gauge**

Ground displacement is primarily measured by a seismometer, which is specifically designed to detect and record the motions of the ground caused by seismic waves from earthquakes or other ground movements. These instruments are highly sensitive and can measure even the smallest changes in position resulting from ground displacement. Seismometers work by detecting the vibrations in the ground and translating these into electrical signals, allowing for accurate measurements over time. This capability makes them essential in understanding geological phenomena and providing data for engineering, construction, and safety assessments in areas prone to seismic activity. While accelerometers can also measure ground motion, they typically provide data on acceleration rather than direct displacement. Transducers and strain gauges serve different purposes in measuring physical quantities like pressure or material strain, respectively, rather than directly measuring ground movement. This specialization in capturing ground movements firmly establishes seismometers as the preferred instrument for this purpose.

2. Which property best describes an isotropic material?

- A. Consistent properties in all directions**
- B. Variable properties based on direction**
- C. Only elastic properties**
- D. Materials that do not change shape**

An isotropic material is best characterized by having consistent properties in all directions. This means that regardless of the orientation in which the material is measured, its mechanical and thermal properties remain the same. For instance, the Young's modulus, thermal conductivity, and strength of an isotropic material do not vary with directional changes. This uniformity is crucial in many engineering applications where predictable material behavior is essential. In contrast, materials that exhibit variable properties based on direction are classified as anisotropic, and they can behave differently depending on the direction of load or force applied. The other options, such as having only elastic properties or not changing shape, do not adequately capture the essence of isotropy in materials. Isotropic materials can be elastic, plastic, or exhibit different deformation characteristics, but it is their directional uniformity in properties that truly defines them.

3. What does coordinate geometry (COGO) involve in surveying?

- A. Calculating the area of land parcels
- B. Mathematical calculations of geometric dimensions and positions**
- C. Measuring terrain slopes and elevations
- D. Creating graphical representations of survey data

Coordinate geometry, often referred to as COGO, is fundamentally concerned with mathematical calculations related to geometric dimensions and the positioning of points in space. In surveying, this branch of geometry allows surveyors to precisely determine coordinates based on angles, distances, and other geometric relationships. COGO employs algebraic formulas to analyze the shapes, sizes, and locations of land features, which helps in mapping and planning land parcels efficiently. The importance of COGO in surveying is further emphasized by its application in defining property boundaries, creating plans for land development, and facilitating the integration of survey data into geographic information systems (GIS). By leveraging COGO, surveyors can ensure accuracy and precision in their measurements and analyses, which are critical for effective land surveying and design tasks. The other options, while relevant to various aspects of surveying, do not encompass the primary focus of coordinate geometry. For instance, calculating the area of land parcels is more about spatial analysis than the direct application of coordinate geometry principles. Similarly, measuring terrain slopes and elevations often involves topographical surveying techniques that may not rely directly on COGO principles, and creating graphical representations of survey data is more aligned with cartography and data visualization than the mathematical calculations inherent in coordinate geometry.

4. Which of the following best defines a soft storey?

- A. It has more than 80% strength compared to the storey above
- B. It has less than 70% stiffness compared to the story above**
- C. It is equal to the average stiffness of the storeys above
- D. It features uniform strength across all storeys

A soft storey refers to a level in a building that has significantly lower stiffness than the levels above it, which can compromise the structural stability during an earthquake or substantial wind forces. Specifically, the definition highlights that a soft storey has less than 70% of the stiffness compared to the storey above. This reduced stiffness can lead to increased lateral movement and deformation, making the building more vulnerable to damage during seismic events. In the context of the other options, the percentage thresholds related to strength and uniformity do not accurately reflect the characteristics that define a soft storey. The focus is not on strength alone (as mentioned in the first and fourth choices) but rather on comparative stiffness, which is the critical factor in assessing a soft storey condition. The average stiffness referenced in the third choice is irrelevant in defining a soft storey, as the concept is based on the relationship between the stiffness of a particular storey and that of the storey directly above it.

5. Which of the following describes the proportional relationship between stress and strain in materials?

- A. Stress-Strain Modulus**
- B. Elastic Modulus**
- C. Young's Modulus**
- D. Compressibility**

The correct answer identifies Young's Modulus as it specifically refers to the proportional relationship between stress and strain in materials. Young's Modulus quantifies how much a material will deform under a given stress, effectively capturing the elastic behavior within the linear elastic range of the material's response. Stress is the internal force per unit area within materials, while strain is the deformation resulting from that stress. Young's Modulus is defined mathematically as the ratio of tensile stress to tensile strain, making it a fundamental property used in engineering and materials science to assess material stiffness. This relationship implies that for many materials, within their elastic limits, if the stress is doubled, the strain will also double, maintaining a consistent ratio defined by Young's Modulus. Other terminology, such as the Stress-Strain Modulus and Elastic Modulus, could refer to similar concepts but are often not as precisely defined in the context of universal material behavior as Young's Modulus. For instance, the term 'Elastic Modulus' may encompass different types of modulus (like shear modulus or bulk modulus) used to describe behavior in different forms of deformation. Compressibility, on the other hand, describes how much a material will decrease in volume under pressure and does not directly address the linear relationship

6. Which term refers to the capability of a material to withstand deformation and absorb energy before reaching failure?

- A. Toughness**
- B. Elasticity**
- C. Resilience**
- D. Relaxation**

The correct response is toughness. Toughness is defined as the ability of a material to absorb energy and deform plastically without fracturing. It is a crucial property in materials science because it indicates how well a material can withstand impacts or sudden forces without failing. Tough materials can absorb significant amounts of energy before reaching their failure point, which makes them ideal for applications where resistance to impact and stress is essential. Elasticity refers to a material's ability to return to its original shape and size after being deformed, which is not necessarily related to the energy-absorbing capability before failure. Resilience is more specifically the ability of a material to absorb energy when it is deformed elastically and then return that energy upon unloading, thus it pertains to elastic deformation rather than overall toughness. Relaxation pertains to the reduction of stress in a material over time under constant strain and does not directly relate to the material's ability to absorb energy before failing.

7. What best describes the reciprocal relationship to stiffness in structural engineering?

- A. Elasticity
- B. Flexibility**
- C. Deflection
- D. Rigidity

In structural engineering, flexibility is often described as the reciprocal of stiffness. Stiffness refers to a material's ability to resist deformation under load. When a structure is stiff, it will deform less under a given load compared to a more flexible structure. Thus, the more flexible a structure is, the less stiff it is, establishing a direct relationship between the two concepts. Flexibility allows a structure to bend or deflect under load, which can be a desirable trait in some applications to absorb energy or accommodate movement (like in seismic design). However, excessive flexibility can lead to issues with stability and serviceability, which is why understanding the balance between stiffness and flexibility is critical in design. Elasticity, while related to stiffness, describes the property of a material to return to its original shape after deformation. Deflection concerns the amount of displacement a structural member undergoes when subjected to load, and rigidity is another term often used interchangeably with stiffness, emphasizing a structure's resistance to bending or twisting. Thus, flexibility stands out as the correct description of the reciprocal relationship to stiffness.

8. What does the term resilience refer to in material properties?

- A. Ability to absorb energy without exceeding elastic limits**
- B. Ability to deform plastically before rupture
- C. Ability to withstand tensile stress
- D. Ability to break under compressive load

Resilience in the context of material properties specifically refers to a material's ability to absorb energy when it is deformed elastically and then release that energy upon unloading. This characteristic is crucial, particularly in materials that are subject to dynamic or impact loading, where they must return to their original shape without permanent deformation. When a material is resilient, it can endure the energy imposed by stress without surpassing its elastic limit, which ensures that it can return to its original dimensions once the stress is removed. This property is significant in applications where flexibility and durability are essential, such as in springs or shock-absorbing materials. The other choices highlight different material characteristics. The second option deals with plastic deformation, which occurs when a material stretches beyond its elastic limit, leading to permanent changes. The third option addresses tensile strength, focusing on a material's capacity to resist being pulled apart, while the last emphasizes a material's failure under compressive loads. While all these properties are important in different contexts, resilience is distinctly tied to the ability to absorb and release energy without permanent deformation.

9. What principle states that stress is proportional to strain within the elastic region?

- A. Boyle's Law
- B. Hooke's Law**
- C. Newton's Law
- D. Bernoulli's Principle

The principle that states stress is proportional to strain within the elastic region is Hooke's Law. This foundational concept in mechanics describes how materials deform under load. According to Hooke's Law, if a material is subjected to a force (stress), it will deform (strain) proportionally, provided that the limit of elasticity is not exceeded. This means that within a certain range, the more force you apply, the more the material stretches or compresses, following a linear relationship. This principle is crucial in engineering and materials science because it allows engineers to predict how materials will behave under various types of loads, thus ensuring safe and effective design. Understanding Hooke's Law enables professionals to determine the limits of material usage, thereby preventing structural failures in constructions and designs.

10. What does "azimuth" measure in surveying?

- A. The elevation of a point
- B. The distance from one point to another
- C. The angle between a reference direction and a point**
- D. The area of land surveyed

Azimuth is a fundamental term in surveying that refers specifically to the angle measured from a reference direction, usually true north, to the line connecting the observer to a point of interest. This measurement is typically expressed in degrees, ranging from 0° to 360°. Understanding azimuth is crucial for determining directions and positions within a survey, making it an essential element in navigation and geospatial analysis. In contrast, measuring elevation pertains to how high a point is relative to a benchmark, which is not relevant to the concept of azimuth. Similarly, distance measurement focuses on how far apart two points are, which does not consider the directional angle. The area of land surveyed is a distinct measurement concerning surface area and not related to angular measurement or direction. Thus, correctly identifying azimuth as the angle between a reference direction and a point highlights its importance in establishing accurate locational data in surveying practices.

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://gertcpsad.examzify.com>

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

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