

MACHINE DESIGN AND SHOP PRACTICE (MDSP) INHOUSE PRACTICE EXAM (SAMPLE) STUDY GUIDE



SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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. Which mechanism is typically used to connect two shafts with misalignment, known as Oldham's coupling?**
 - A. Oldham's coupling
 - B. Whitworth quick return mechanism
 - C. Elliptic trammel
 - D. Pantograph mechanism

- 2. Why are plain washers commonly installed beneath the head of a bolt or nut?**
 - A. To distribute the load over a larger bearing surface
 - B. To increase the effective thread engagement of the bolt
 - C. To reduce the tightening torque required during assembly
 - D. To increase the tensile strength of the threaded fastener

- 3. Which type of key is Kennedy key another name for?**
 - A. Saddle key
 - B. Roll pin
 - C. Tangential key
 - D. Woodruff key

- 4. From design point of view, spherical pressure vessels are preferred over cylindrical pressure vessels because**
 - A. are cost effective in fabrication
 - B. have uniform higher circumferential stress
 - C. uniform lower circumferential stress
 - D. have a larger volume for the same quantity of material used

- 5. The wires in a wire rope are subjected to which stresses?**
 - A. Tensile and bending stress
 - B. Tensile stress
 - C. Shear stress
 - D. Crushing stress

6. In a gear train, the train value is the reciprocal of the speed ratio.
- A. Speed ratio
 - B. Double the speed ratio
 - C. Half the speed ratio
 - D. Reciprocal of the speed ratio
7. Which mineral has Mohs hardness of 5?
- A. Apatite
 - B. Gypsum
 - C. Quartz
 - D. Fluor spar
8. In column stability analysis, which factor has the most significant influence on the shape assumed by a column when it buckles under compressive loading?
- A. End Conditions
 - B. Elastic modulus of the material
 - C. Slenderness ratio
 - D. Cross-sectional dimensions
9. Beach marks on a fracture surface are characteristic of which type of failure?
- A. Fatigue failure
 - B. Plastic yielding
 - C. Brittle fracture due to overload
 - D. Bearing failure
10. A bearing is designated by the number 410. It means that it is a bearing of which type?
- A. light series with bore diameter of 10 mm
 - B. heavy series with bore diameter of 50 mm
 - C. medium series with bore diameter of 50 mm
 - D. light series with bore diameter of 50 mm

Answers

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

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Explanations

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1. Which mechanism is typically used to connect two shafts with misalignment, known as Oldham's coupling?

- A. Oldham's coupling**
- B. Whitworth quick return mechanism
- C. Elliptic trammel
- D. Pantograph mechanism

Oldham coupling is built to take up misalignment between two shafts while still transmitting torque. It does this with three parts: two outer hubs fixed to each shaft and a middle sliding plate that fits between them. Pins on the outer hubs engage slots in the middle plate, so as the shafts aren't perfectly aligned, the middle plate can slide laterally to keep the pins engaged. This pin-slot arrangement allows the shafts to run true without bending, accommodating parallel offset and small angular misalignment while a rigid torque transfer is maintained. The other mechanisms listed are not used to join misaligned shafts; they serve different purposes in motion generation, drawing, or copying tasks.

2. Why are plain washers commonly installed beneath the head of a bolt or nut?

- A. To distribute the load over a larger bearing surface**
- B. To increase the effective thread engagement of the bolt
- C. To reduce the tightening torque required during assembly
- D. To increase the tensile strength of the threaded fastener

When you tighten a bolt or nut, the force is concentrated on a small bearing area under the head or nut. If that surface is softer or rough, it can indent or wear, reducing the clamping force and risking joint damage or fatigue. A plain washer spreads the load over a larger bearing surface, which protects the parts, prevents embedment, and helps maintain a steady clamp even if there are minor surface irregularities. It doesn't change how much of the bolt's threads engage, it doesn't reduce the tightening torque, and it doesn't increase the bolt's tensile strength. So the main purpose is to distribute the load over a larger bearing surface.

3. Which type of key is Kennedy key another name for?

- A. Saddle key
- B. Roll pin
- C. Tangential key**
- D. Woodruff key

Torque is transferred from a shaft to a hub by a key that sits in matching slots on both parts. The Kennedy key is another name for a tangential key, which engages in a keyway so that the contact and drive occur along a line tangent to the shaft's circumference. This tangential engagement provides a straightforward, compact way to transmit torque and is a distinct style from other key forms. For example, Woodruff keys use a semicircular shape and a matching semicircular slot, saddle keys sit in a saddle-shaped groove, and a roll pin is a separate type of fastener, not a key. So, the Kennedy key is the same as the tangential key.

4. From design point of view, spherical pressure vessels are preferred over cylindrical pressure vessels because

- A. are cost effective in fabrication
- B. have uniform higher circumferential stress
- C. uniform lower circumferential stress**
- D. have a larger volume for the same quantity of material used

The main concept is how shape controls stress under internal pressure. In a thin-walled pressure vessel, the circumferential (hoop) stress governs how thick the wall must be. A spherical shell distributes the load evenly in all directions, so the hoop stress is uniform around the surface and is lower than in a cylinder (for the same internal pressure and dimensions). Specifically, the sphere has about half the circumferential stress of a cylinder, allowing the same safety with a thinner wall or less material. That uniform, lower stress state is why spherical vessels are favored in design. The other options aren't the primary design reason: fabrication cost isn't guaranteed to be lower, the hoop stress isn't higher, and while a sphere can enclose more volume per material, the key advantage in design is the uniform, reduced circumferential stress.

5. The wires in a wire rope are subjected to which stresses?

- A. Tensile and bending stress**
- B. Tensile stress
- C. Shear stress
- D. Crushing stress

The most important stresses in a wire rope are axial tension along its length and bending when the rope follows a curve. When the rope is loaded, the wires carry the load in tension, so each wire experiences tensile stress. As the rope passes over pulleys or drums, it bends, causing fibers on the outer side of the bend to be stretched more than those on the inner side, which creates bending stress across the rope's cross-section. Together, these two stresses—tensile and bending—define the primary stress state in a wire rope. Pure shear or crushing stress aren't the dominant internal stresses in normal rope operation, though contact with a drum does introduce some surface pressure; that's not the main internal stress state. Relying on tensile stress alone ignores the bending effects that occur when the rope bends around sheaves.

6. In a gear train, the train value is the reciprocal of the speed ratio.

- A. Speed ratio
- B. Double the speed ratio**
- C. Half the speed ratio
- D. Reciprocal of the speed ratio

In gear trains, the train value is defined as the reciprocal of the speed ratio. The speed ratio compares how fast the driver turns relative to the driven gear, while the train value describes that same relationship in the inverse form. So the train value is 1 divided by the speed ratio, not the speed ratio itself, nor any multiple like double or half. This makes the description "the reciprocal of the speed ratio" the correct one.

7. Which mineral has Mohs hardness of 5?

- A. Apatite**
- B. Gypsum
- C. Quartz
- D. Fluor spar

Hardness on the Mohs scale is a measure of scratch resistance. A mineral with a given hardness can scratch minerals with lower values and be scratched by minerals with higher values. Apatite has a hardness of 5, which places it in the middle of the scale. That means it can scratch softer minerals (like fluorite at 4 or gypsum at 2) but can be scratched by harder ones (such as feldspar around 6 or quartz at 7). The other minerals listed have different values: gypsum is much softer, fluorite is 4, quartz is harder, and feldspar is about 6. So apatite is the mineral with Mohs hardness of 5.

8. In column stability analysis, which factor has the most significant influence on the shape assumed by a column when it buckles under compressive loading?

- A. End Conditions**
- B. Elastic modulus of the material
- C. Slenderness ratio
- D. Cross-sectional dimensions

End restraints at the ends of a column govern the buckling mode, which is the shape the column adopts when it buckles. In Euler buckling, the deflected shape $y(x)$ must satisfy the governing differential equation and the boundary conditions set by how the ends are supported. These boundary constraints—whether the ends can rotate (pinned), are fixed against rotation, or are free—select the allowable waveforms, so the same column under the same load can buckle into different shapes depending on end conditions. The elastic modulus, cross-sectional size, and slenderness ratio affect how easily buckling occurs (the critical load) but do not fix the buckled shape as strongly as the end restraints do. For example, simply supported ends yield a half-sine buckling shape, while fixed ends produce a different shape with zero slope at the ends.

9. Beach marks on a fracture surface are characteristic of which type of failure?

- A. Fatigue failure**
- B. Plastic yielding
- C. Brittle fracture due to overload
- D. Bearing failure

Beach marks on a fracture surface indicate fatigue failure. In fatigue, a crack initiates at a flaw or stress concentrator and grows gradually with each load cycle. The fracture surface records these growth steps as concentric or wavy lines—beach marks—that resemble a shoreline. Each mark corresponds to a stage in crack propagation, and the spacing can reflect how fast the crack grew during different loading conditions, with a final rapid fracture occurring when the remaining section can no longer support the load. This pattern is distinct from plastic yielding, which shows significant plastic deformation and necking; brittle overload, which produces a relatively featureless cleavage surface; or bearing failure, which involves wear or seizure of bearing surfaces rather than these characteristic growth lines.

10. A bearing is designated by the number 410. It means that it is a bearing of which type?

- A. light series with bore diameter of 10 mm
- B. heavy series with bore diameter of 50 mm**
- C. medium series with bore diameter of 50 mm
- D. light series with bore diameter of 50 mm

In bearing designation codes, the first digit shows the series (load/robustness), while the last two digits encode the bore diameter. Here, the leading digit 4 denotes a heavy-series bearing, and the trailing code 10 corresponds to a bore diameter of 50 mm in the standard sizing table used in this context. So a designation of 410 identifies a heavy-series bearing with a 50 mm bore.

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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://mdspinhouse.examzify.com>

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

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