ENGINEERING MECHANICS PRACTICE EXAM (SAMPLE)

STUDY GUIDE

SAMPLE STUDY GUIDE WITH LIMITED QUESTIONS

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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. **Assume that an object has no unbalanced force acting on it. Which statement about the object is true?**

   A. the object may be in motion

   B. the object must be slowing down

   C. the object must be at rest

   D. the object may be speeding up

2. **For a planet moving around the sun, which quantity remains constant under a central gravitational force?**

   A. Angular momentum

   B. Linear momentum

   C. Kinetic energy

   D. Speed

3. **What refers to a pair of equal, opposite and parallel forces?**

   A. Couple

   B. Moment

   C. Torque

   D. All of the above

4. **Which of the following ranges corresponds to ordinary car tires on concrete?**

   A. 0.05 - 0.06

   B. 0.1 - 0.2

   C. 0.01 - 0.015

   D. 0.0002 - 0.0010

5. **The gravity in the Moon is about**

   A. 0.6 m/s2

   B. 2.6 m/s2

   C. 3.6 m/s2

   D. 1.6 m/s2

6. Which type of impact occurs when motion is not directed along the line of impact?

A. Central impact

B. Direct impact

C. Oblique impact

D. Eccentric impact

7. The second moment of area is also known as the moment of inertia. Which statement is true?

A. They are the same quantity but used in different contexts

B. They are always different quantities

C. They are the same for all shapes

D. They are not related

8. Which branch focuses on the geometry of motion without regard to forces?

A. Statics

B. Kinematics

C. Dynamics

D. Kinetics

9. Is a sketch of a body completely isolated or free from all other bodies described as what?

A. Free body diagram

B. Equilibrium

C. Coplanar

D. Force

10. The centroid concept for a distributed load is used to locate the point where the equivalent single force acts.

A. At The Midpoint Of The Span

B. The Centroid Of The Area Of The Loading Curve

C. At The Point Where The Load Begins

D. At The End Of The Loading Region

Answers

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

Explanations

1. Assume that an object has no unbalanced force acting on it. Which statement about the object is true?

A. the object may be in motion

B. the object must be slowing down

C. the object must be at rest

D. the object may be speeding up

The key idea is inertia: when no unbalanced force acts, the net force is zero and acceleration is zero. With zero acceleration, the velocity stays constant. So the object can remain at rest or continue moving in a straight line at constant speed. That's why it may be in motion. It cannot be slowing down or speeding up, since that would require a nonzero acceleration, and it is not required to be at rest because uniform motion is also possible.

2. For a planet moving around the sun, which quantity remains constant under a central gravitational force?

A. Angular momentum

B. Linear momentum

C. Kinetic energy

D. Speed

When a planet moves under a central gravitational force, the torque about the center (the sun) is zero because the force points along the radius. That makes the angular momentum about the sun constant. Angular momentum for the planet is $L = m\, r \times v$, and in planar motion its magnitude is $L = m\, r\, v_t$, with v_t the tangential component of velocity. Since $dL/dt = r \times F = 0$ for a central force, L does not change as the planet orbits. This conservation leads to Kepler's second law: equal areas are swept in equal times, meaning the planet adjusts its speed so that the product of its radius and its tangential speed stays the same as it moves. The other possibilities don't stay constant in general. Linear momentum of the planet isn't constant because gravity (an external force) acts on it. Kinetic energy isn't constant because gravitational potential energy is exchanged with kinetic energy as the planet moves closer to or farther from the sun. Only the total mechanical energy of the planet-sun system is conserved. Speed itself isn't constant either, since the planet speeds up when closer to the sun and slows down when farther away.

3. What refers to a pair of equal, opposite and parallel forces?

A. Couple

B. Moment

C. Torque

D. All of the above

A couple is a pair of equal, opposite and parallel forces whose lines of action are distinct. The forces cancel in translation, giving zero resultant force, but because they act apart from each other they produce a pure rotation. The turning effect, or moment, is equal to the force magnitude times the perpendicular distance between the lines of action ($M = F \times d$). Moment (or torque) describes that rotational effect, but the term that names the two forces together is a couple.

4. Which of the following ranges corresponds to ordinary car tires on concrete?

A. 0.05 - 0.06

B. 0.1 - 0.2

C. 0.01 - 0.015

D. 0.0002 - 0.0010

Rolling resistance is the small opposing force that a tire experiences as it deforms and recovers while rolling on a surface. For ordinary car tires on concrete, this resistance is relatively modest because the tire's deformation losses are moderate on a hard, smooth surface. The coefficient describing this rolling resistance typically lies around 0.01 to 0.02; the range 0.01 to 0.015 fits right in this practical band and reflects common tires and concrete conditions. In practice, the resisting force is F = Crr × N, where N is the normal load; for a typical car, this yields a few hundred newtons of resistance, which aligns with real-world drivetrain requirements and fuel efficiency. Values much higher would imply unrealistically large losses for smooth concrete, while values far lower would underestimate the energy lost to tire deformation.

5. The gravity in the Moon is about

A. 0.6 m/s2

B. 2.6 m/s2

C. 3.6 m/s2

D. 1.6 m/s2

Gravity on the Moon is about 1.6 m/s^2. This value is roughly one-sixth of Earth's gravity, since Earth's surface gravity is about 9.8 m/s^2. The Moon's smaller mass and size mean its surface gravity is weaker, and the standard rough figure is g ≈ 1.6 m/s^2. So the option around 1.6 m/s^2 is the best match. The other numbers are farther from the actual lunar gravity. This also explains why objects weigh about six times less on the Moon, even though their mass remains the same.

6. Which type of impact occurs when motion is not directed along the line of impact?

A. Central impact

B. Direct impact

C. Oblique impact

D. Eccentric impact

The key idea is how the impulse during impact is directed relative to the contact line. The line of impact is the common normal at the contact point along which the impulse acts during collision. When the approaching bodies' motion is directed along that line, the impact is a central (or direct) collision—the velocity change is purely along the normal, and there's no tangential effect. If the motion is not aligned with the line of impact, there's a tangential component of the relative velocity at contact. The impulse itself still acts along the line of impact (the normal), but because the incoming motion isn't along that line, the interaction is at an angle to the velocity: the outcome is an oblique impact. This off-angle interaction often leads to changes in both the normal and tangential components of velocity (and can introduce spin if friction is present). So, when motion is not directed along the line of impact, the collision is oblique.

7. The second moment of area is also known as the moment of inertia. Which statement is true?

A. They are the same quantity but used in different contexts

B. They are always different quantities

C. They are the same for all shapes

D. They are not related

The concept being tested is that the second moment of area and the moment of inertia share the same mathematical form and describe how a distribution is spread about an axis, but they apply to different physical quantities. The second moment of area is an area property used in bending and stability, while the (mass) moment of inertia is a mass property used in rotational dynamics. They are the same kind of quantity in form; they just refer to area versus mass distributions. They're related by density: for a uniform plate, the mass moment of inertia equals the area moment of inertia multiplied by the density (I_mass = ρ I_area). Because of that, they're effectively the same concept in different contexts, which is why this statement is the best choice. They aren't always numerically identical (density matters), they aren't universally identical for all shapes, and they aren't unrelated.

8. Which branch focuses on the geometry of motion without regard to forces?

A. Statics

B. Kinematics

C. Dynamics

D. Kinetics

Kinematics is the study of motion itself—the geometry of how position, velocity, and acceleration change over time—without reference to forces or causes. This focus on the path and timing of motion, rather than what makes it happen, is what makes it the correct choice. Statically oriented analysis deals with bodies at rest or in equilibrium, where forces balance and there's no motion to describe. Dynamics (or kinetics) looks at how forces produce motion, linking motion to causes like mass and force. So the geometry of motion without regard to forces is uniquely the domain of kinematics. For example, describing a car's position and speed along a track over time without considering engine force or friction illustrates kinematics.

9. Is a sketch of a body completely isolated or free from all other bodies described as what?

A. Free body diagram

B. Equilibrium

C. Coplanar

D. Force

The main idea being tested is the idea of a free body diagram: a sketch that isolates a single body from its surroundings and shows all external forces acting on it. This kind of diagram is created by "freeing" the body from supports or other bodies and then labeling forces such as gravity, normal reaction, friction, and any external loads. It's the standard tool for setting up equations of motion or equilibrium, because it focuses on the forces that must be balanced or accounted for. That's why the best choice is the free body diagram. Equilibrium describes a condition (no net force or moment) that might be analyzed using such a diagram, but it isn't the depiction itself. Coplanar refers to forces lying in the same plane, a geometric property rather than the representation of the body and its forces. Force is a single vector quantity, whereas a free body diagram can depict many forces acting on the isolated body.

10. The centroid concept for a distributed load is used to locate the point where the equivalent single force acts.

A. At The Midpoint Of The Span

B. The Centroid Of The Area Of The Loading Curve

C. At The Point Where The Load Begins

D. At The End Of The Loading Region

When you replace a distributed load with a single equivalent force, the force acts at the centroid of the load distribution. Think of the load w(x) along the beam as a shape whose area represents the total load. The resultant force equals that total area, Q = ∫ w(x) dx, and its line of action must pass through the centroid of that area to produce the same moment balance as the actual distribution. The location is given by x_R = (∫ x w(x) dx) / (∫ w(x) dx). If the loading is uniform over a span, the centroid is at the midpoint of that span; if the load is nonuniform, it shifts toward regions with greater intensity. For discrete loads, the equivalent position is a weighted average of the load positions. In short, the equivalent single force acts at the centroid of the area under the loading curve.

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://engineeringmechanics.examzify.com

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