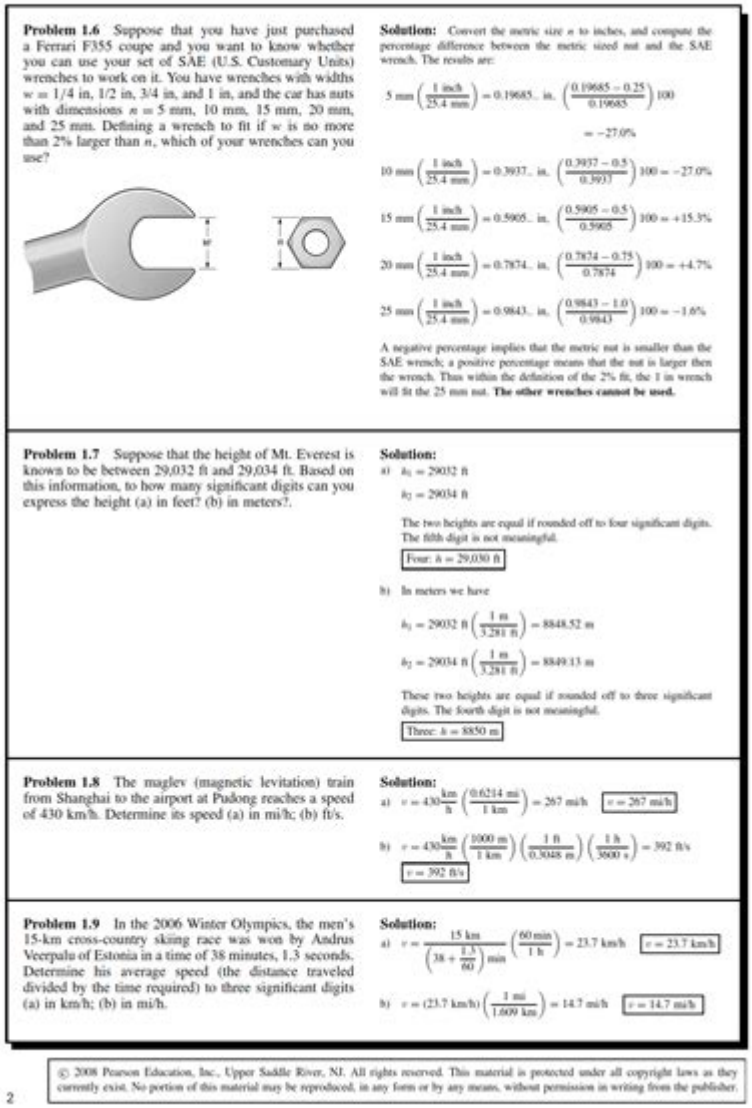
Engineering Mechanics Statics 5th Edition Solutions



Problem 1.6 Suppose that you have just purchased a Ferrari F355 coupe and you want to know whether you can use your set of SAE (U.S. Customary Units) wrenches to work on it. You have wrenches with widths $w = 1/4$ in, 1/2 in, 3/4 in, and 1 in, and the car has nuts with dimensions $n = 5$ mm, 10 mm, 15 mm, 20 mm, and 25 mm. Defining a wrench to fit if w is no more than 2% larger than n, which of your wrenches can you use?

Solution: Convert the metric size n to inches, and compute the percentage difference between the metric sized nut and the SAE wrench. The results are:

$$5 \text{ mm}\left(\frac{1 \text{ inch}}{25.4 \text{ mm}}\right) = 0.19685\ldots \text{ in.} \quad \left(\frac{0.19685 - 0.25}{0.19685}\right)100 = -27.0\%$$

$$10 \text{ mm}\left(\frac{1 \text{ inch}}{25.4 \text{ mm}}\right) = 0.3937\ldots \text{ in.} \quad \left(\frac{0.3937 - 0.5}{0.3937}\right)100 = -27.0\%$$

$$15 \text{ mm}\left(\frac{1 \text{ inch}}{25.4 \text{ mm}}\right) = 0.5905\ldots \text{ in.} \quad \left(\frac{0.5905 - 0.5}{0.5905}\right)100 = +15.3\%$$

$$20 \text{ mm}\left(\frac{1 \text{ inch}}{25.4 \text{ mm}}\right) = 0.7874\ldots \text{ in.} \quad \left(\frac{0.7874 - 0.75}{0.7874}\right)100 = +4.7\%$$

$$25 \text{ mm}\left(\frac{1 \text{ inch}}{25.4 \text{ mm}}\right) = 0.9843\ldots \text{ in.} \quad \left(\frac{0.9843 - 1.0}{0.9843}\right)100 = -1.6\%$$

A negative percentage implies that the metric nut is smaller than the SAE wrench; a positive percentage means that the nut is larger then the wrench. Thus within the definition of the 2% fit, the 1 in wrench will fit the 25 mm nut. **The other wrenches cannot be used.**

Problem 1.7 Suppose that the height of Mt. Everest is known to be between 29,032 ft and 29,034 ft. Based on this information, to how many significant digits can you express the height (a) in feet? (b) in meters?.

Solution:

a) $h_1 = 29032$ ft

$h_2 = 29034$ ft

The two heights are equal if rounded off to four significant digits. The fifth digit is not meaningful.

Four: $h = 29{,}030$ ft

b) In meters we have

$$h_1 = 29032 \text{ ft}\left(\frac{1 \text{ m}}{3.281 \text{ ft}}\right) = 8848.52 \text{ m}$$

$$h_2 = 29034 \text{ ft}\left(\frac{1 \text{ m}}{3.281 \text{ ft}}\right) = 8849.13 \text{ m}$$

These two heights are equal if rounded off to three significant digits. The fourth digit is not meaningful.

Three: $h = 8850$ m

Problem 1.8 The maglev (magnetic levitation) train from Shanghai to the airport at Pudong reaches a speed of 430 km/h. Determine its speed (a) in mi/h; (b) ft/s.

Solution:

a) $v = 430\frac{\text{km}}{\text{h}}\left(\frac{0.6214 \text{ mi}}{1 \text{ km}}\right) = 267 \text{ mi/h}$ $\boxed{v = 267 \text{ mi/h}}$

b) $v = 430\frac{\text{km}}{\text{h}}\left(\frac{1000 \text{ m}}{1 \text{ km}}\right)\left(\frac{1 \text{ ft}}{0.3048 \text{ m}}\right)\left(\frac{1 \text{ h}}{3600 \text{ s}}\right) = 392 \text{ ft/s}$

$\boxed{v = 392 \text{ ft/s}}$

Problem 1.9 In the 2006 Winter Olympics, the men's 15-km cross-country skiing race was won by Andrus Veerpalu of Estonia in a time of 38 minutes, 1.3 seconds. Determine his average speed (the distance traveled divided by the time required) to three significant digits (a) in km/h; (b) in mi/h.

Solution:

a) $v = \dfrac{15 \text{ km}}{\left(38 + \frac{1.3}{60}\right)\text{min}}\left(\dfrac{60 \text{ min}}{1 \text{ h}}\right) = 23.7 \text{ km/h}$ $\boxed{v = 23.7 \text{ km/h}}$

b) $v = (23.7 \text{ km/h})\left(\dfrac{1 \text{ mi}}{1.609 \text{ km}}\right) = 14.7 \text{ mi/h}$ $\boxed{v = 14.7 \text{ mi/h}}$

Engineering mechanics statics 5th edition solutions are an essential resource for students and professionals alike in the field of engineering. This comprehensive guide not only aids in understanding the fundamental principles of statics but also provides detailed solutions to complex problems that are pivotal for mastering the subject. Whether you are a student preparing for exams or a practicing engineer looking to refresh your knowledge, the solutions manual for the 5th edition of Engineering Mechanics: Statics is invaluable.

Understanding Engineering Mechanics: Statics

Engineering Mechanics: Statics is a foundational course that deals with forces and their effects on bodies at rest. The subject emphasizes the analysis of physical systems in equilibrium, which is critical for various engineering applications, including structural engineering, mechanical design, and aerospace engineering.

The Importance of Statics in Engineering

Statics forms the bedrock for many engineering disciplines. Here are some reasons why it is crucial:

- **Foundation for Advanced Topics:** Knowledge of statics is essential for understanding dynamics, fluid mechanics, and structural analysis.
- **Real-World Applications:** Engineers use statics to ensure safety and stability in structures like bridges, buildings, and machinery.
- **Problem-Solving Skills:** The course develops critical thinking and analytical skills necessary for tackling complex engineering problems.

Overview of the 5th Edition Solutions Manual

The 5th edition of Engineering Mechanics: Statics, authored by R.C. Hibbeler, has been widely adopted in engineering courses around the world. The solutions manual provides step-by-step explanations to the textbook problems, making it easier for students to grasp difficult concepts. Here’s what you can expect from the solutions manual:

Key Features of the Solutions Manual

The solutions manual for the 5th edition includes:

1. **Detailed Solutions:** Each problem is solved in a logical sequence, making it easier to follow the thought process behind each solution.
2. **Diagrams and Illustrations:** Visual aids accompany many solutions, enhancing understanding of complex problems.

3. **Supplementary Examples:** Additional examples are included to reinforce learning and provide extra practice.

4. **Step-by-Step Approach:** Solutions are broken down into manageable steps, promoting a better grasp of underlying principles.

How to Effectively Use the Solutions Manual

While the solutions manual is a powerful tool, it is essential to use it effectively to maximize your learning. Here are some strategies:

Study Techniques

- **Attempt Problems First:** Before consulting the solutions, try to solve the problems independently to develop your problem-solving skills.
- **Review Step-by-Step Solutions:** If you encounter difficulties, look at the step-by-step solutions to understand where you went wrong.
- **Work in Groups:** Discussing problems and solutions with peers can enhance understanding and expose you to different approaches.
- **Use as a Supplement:** Treat the manual as a supplement to the textbook rather than a primary resource. Focus on understanding concepts first.

Common Topics Covered in Engineering Mechanics: Statics

Understanding the core topics of statics is essential for mastering the subject. Here are some of the common topics covered in the 5th edition:

Key Topics

1. **Equilibrium of Particles:** Analysis of forces acting on particles in static equilibrium.

2. **Equilibrium of Rigid Bodies:** Study of external forces and moments on

rigid bodies.

3. **Structural Analysis:** Understanding trusses, beams, and frames, including methods of joints and sections.
4. **Centroids and Centers of Gravity:** Calculation of centroids and centers of gravity for various shapes.
5. **Friction:** Analysis of frictional forces and their effects on motion and stability.
6. **Distributed Loads:** Understanding how distributed loads affect beams and structures.

The Role of Practice in Mastering Statics

Mastering engineering mechanics statics requires consistent practice. The more problems you solve, the better your understanding will become. Here are some tips for effective practice:

Effective Practice Strategies

- **Regular Study Schedule:** Set aside dedicated time each week to review and practice statics problems.
- **Use Additional Resources:** Consider using online resources, videos, or additional textbooks to reinforce learning.
- **Practice Under Timed Conditions:** Simulate exam conditions by timing yourself while solving problems to improve speed and accuracy.
- **Seek Help When Needed:** Don’t hesitate to ask for help from instructors or peers when you encounter difficult concepts.

Where to Find Engineering Mechanics Statics 5th Edition Solutions

Finding the solutions manual can be straightforward if you know where to look. Here are some reliable sources:

Recommended Sources

1. **University Libraries:** Many university libraries provide access to solutions manuals for students.
2. **Online Retailers:** Websites like Amazon or eBay often have new or used copies available for purchase.
3. **Publisher’s Website:** Check the publisher’s website for official resources and supplementary materials.
4. **Study Groups and Forums:** Online forums and study groups may share resources, including solutions manuals.

Conclusion

In conclusion, **engineering mechanics statics 5th edition solutions** are an indispensable resource for students and professionals aiming to master the subject. By utilizing the solutions manual effectively and practicing regularly, you can build a solid foundation in statics that will serve you well in your engineering career. Remember, the goal is not just to find answers but to understand the underlying principles that govern static systems. With dedication and the right resources, you can excel in engineering mechanics statics and apply your knowledge to real-world engineering challenges.

Frequently Asked Questions

What is the importance of studying engineering mechanics statics?

Studying engineering mechanics statics is crucial for understanding the behavior of stationary bodies under the action of forces, which is fundamental in fields like civil, mechanical, and aerospace engineering.

Where can I find solutions for the Engineering Mechanics Statics 5th edition textbook?

Solutions for the Engineering Mechanics Statics 5th edition textbook can typically be found in the textbook's companion website, educational platforms, or by purchasing solution manuals from academic publishers.

Are the solutions for Engineering Mechanics Statics 5th edition available for free?

While some resources may offer free solutions, comprehensive and verified solutions are usually available through paid services or university resources.

What types of problems are covered in the Engineering Mechanics Statics 5th edition?

The textbook covers various problems related to force systems, equilibrium, structures, friction, and centroids, among others.

Can I use the solutions from the Engineering Mechanics Statics 5th edition for self-study?

Yes, the solutions can be an excellent resource for self-study, helping to clarify concepts and provide examples of problem-solving techniques.

Are there any online forums for discussing Engineering Mechanics Statics 5th edition solutions?

Yes, online forums such as Reddit, Chegg, and engineering-focused websites often have discussions about specific problems from the Engineering Mechanics Statics 5th edition.

What are the key concepts to focus on when studying from the Engineering Mechanics Statics 5th edition?

Key concepts include equilibrium of forces, free-body diagrams, moments, and the analysis of structures and supports.

Is the Engineering Mechanics Statics 5th edition suitable for undergraduate engineering students?

Yes, it is widely used in undergraduate engineering programs as an introductory text for understanding static systems.

How can I effectively use the solutions to enhance my learning in Engineering Mechanics Statics?

To enhance learning, use the solutions to verify your work, understand different approaches to problem-solving, and identify areas where you need further practice.

Engineering Mechanics Statics 5th Edition Solutions

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的答案所说，生物医学工程是用工程领域的原理和技术来解决生物医学——主要是医学的问题。核心思想是把生物体或人体及其某一部分，用工程师的眼光和角度看成一个系统，继而用工程学 …

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