

# Instructor's Solutions Manual

ENGINEERING MECHANICS

# DYNAMICS

TWELFTH EDITION

R. C. HIBBELER

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## To the Instructor

This manual contains the solutions to all the problems in *Engineering Mechanics: Dynamics, Twelfth Edition*. As stated in the preface of the text, the problems in every section are arranged in an approximate order of increasing difficulty. Be aware that answers to all but every fourth problem, which is indicated by an asterisk (\*), are listed in the back of the book. Also, every fourth problem has an additional hint for the solution and is indicated with a bullet (•). Finally, those problems indicated by a square (■) will require additional numerical work.

You may wish to use one of the lists of homework problems given on the following pages. Here you will find four lists for which the answers are in the back of the book, a fifth list for problems without answers, and a sixth sheet which can be used to develop your own personal syllabus. The prepared lists generally represent assignments with an easy, a moderate, and sometimes a more challenging problem.

If you have any questions regarding the solutions in this manual, I would greatly appreciate hearing from you.

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| 13.1–13.4<br>13.5<br>13.6<br>13.7                               | Equation of Motion $x, y, z$<br>Equation of Motion $n, t, b$<br>Equation of Motion $r, \theta, z$<br>Space Mechanics                                                                     |            |
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| 15.1<br>15.2–15.3<br>15.4<br>15.5<br>*15.8<br>*15.9             | Linear Momentum<br>Conservation of Linear Momentum<br>Impact<br>Angular Momentum<br>Steady Fluid Flow<br>Variable Mass                                                                   |            |
| 16.1–16.3<br>16.4<br>16.5<br>16.6<br>16.7<br>16.8               | Rotation About a Fixed Axis<br>Absolute Motion Analysis<br>Relative Velocity Analysis<br>Inst. Center of Zero Velocity<br>Relative Acceleration Analysis<br>Motion Using Rotating Axes   |            |
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| 18.1–18.4<br>18.5                                               | Principle of Work and Energy<br>Conservation of Energy                                                                                                                                   |            |
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| *20.1–*20.2<br>*20.3<br>*20.4                                   | Rotation About a Fixed Point<br>General Motion<br>Relative Motion Analysis                                                                                                               |            |
| *21.1<br>*21.2–*21.3<br>*21.4<br>*21.5–*21.6                    | Moment of Inertia<br>Imp. and Mom., Work and Energy<br>Euler Equations of Motion<br>Gyroscopic and Torque Free Motion                                                                    |            |
| 22.1<br>22.2<br>*22.3–*22.4<br>*22.5–*22.6                      | Free Vibration<br>Energy Methods<br>Forced Vib., Damped Free Vib.<br>Damped Forced Vib., Elec. Analog                                                                                    |            |