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Engineering Design C Sample Title

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Engineering Design C Sample Title

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Second Edition

[ftp_au]
[ftp_af]

Author M. Name
Author Affiliation

Author T. Name
Author Affiliation

copyright page

[fcp_tt]

Dedication

[fcp_tx]

I am indebted to the many students I have had over the years who have helped in the evolution of this edition as well as the first and second editions of this text. I am indebted to the many students I have had over the years who have helped in the evolution of this edition and editions of this text.

—Author Name
Author Affiliation

[fcp_au]
[fcp_af]

[faa_tt]

About the Authors

[faa_ha]
[faa_tx]

Author M. Name received his B.S. and M.S. at Purdue University and his Ph.D. from the University of Illinois. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. The book bears the names of the inaugural group of faculty members, past and present, who have devoted their lives to excellence in teaching and scholarship. They were chosen by their students and their peers as Purdue's finest educators.

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author S. Name received his B.S. from University of Denver, and Ph.D. from Purdue University. Professor Kemmerly first taught at Purdue University and later worked as principal engineer at the only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author T. Name received the B.S.E.E., M.S.E., and Ph.D. from Purdue University, West Lafayette, Indiana. After receiving the Ph.D., he joined the faculty of the Department of Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

[fpr_tt]

Preface

[fpr_tx]

Reading this book is intended to be an enjoyable experience, even though the text is by necessity scientifically rigorous and somewhat mathematical. We, the authors, are trying to share the idea that circuit analysis can be fun. Not only is it useful and downright essential to those who may never analyze another circuit are truly amazed by all the excellent analytical tools that are derived from only three simple scientific laws—Ohm's law and Kirchhoff's voltage and current laws.

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an introductory physics course in which concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_ha]

NEW IN THE SEVENTH EDITION

[fpr_tx]

When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, care was overall content for the benefit of current instructors.

With the mindset that engineering-oriented software packages can be of assistance in the learning process, but should not be used as a crutch, those end-of-chapter problems designated with re always to *check* answers, not provide them.

[fpr_hb]

Key Features

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an physics course in which the basic concepts a background is not a prerequisite, however. Instead, several of the requisite basic concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_hc]

Key Features

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and about the pertinent field relationships.

[fpr_hd]

Key Features In the past, we have tried introducing the basic circuit analysis course with three or four weeks of electromagnetic field theory, so as to be able to define circuit elements more precisely in terms of Maxwell's equations. The results, especially in terms of students' acceptance, were not good.

When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this excit-

ing opportunity. Countless drafts, revisions, care was overall content for the make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, for the benefit of current instructors.

CHANGES TO THE SEVENTH EDITION INCLUDE

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and defined here in terms comments are the pertinent field relationships.

[fpr_ln]

1. Numerous new and revised examples, particularly in the transient analysis portion of the text (Chapters 7, 8, and 9).
2. Several new Practical Application sections existing ones were updated.
10. New multimedia software to accompany the book, including a long-anticipated update to the COSMOS solutions manual system created for instructors.

In the past, we have tried introducing the basic circuit analysis course with three or more precisely in terms of of students' acceptance, were not good.

[fpr_lb]

- *Examples:* An extensive number of worked examples are used throughout contain all the not have to fill in missing steps.
- *Test your understanding:* Exercise or drill problems are included throughout test their understanding of the material just covered.
- *Summary section:* A summary section, in bullet form, follows the text of each chapter. This section summarizes and reviews the basic concepts developed.

This project has been a team effort, and many people have participated and provided things were going. Working with these people has been incredible.

[fprak_tt]

ACKNOWLEDGMENTS

[fprak_tx] I am indebted to the many st udents I have had over the years who have helped in the grateful for their enthusiasm and constructive criticism. The University of New Mexico has my appreciation for an atmosphere conducive to writing this book.

For the Seventh Edition, the following individuals deserve acknowledgment and a debt of gratitude for their time and various versions of the manuscript:

[fprak_lu]

Miroslav M. Begovic, *Georgia Institute of Technology*
Maqsood Chaudhry, *California State University, Fullerton*
Wade Enright, *Viva Technical Solutions, Ltd.*
A.C. Soudack, *University of British Columbia*
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The comments and suggestions from Drs. Jim Zheng, Reginald Perry, Rodney Roberts, and Tom Harrison of the Department of Electrical and Computer Engi-

neering at Florida A&M University and The Florida State University are gratefully acknowledged, as is the incredible effort and enthusiasm of Bill Kennedy at the University of Canterbury, who once again proofread each chapter and provided many useful suggestions. Also, a special thanks to Ken Smart and Dermot Sallis for providing components for photographs, Duncan Shaw-Brown and Kristi Durbin for various photography services, Richard Blaikie for his help with the *h*-parameter Practical Application, Rick Millane for assistance with the image processing Practical Application, and Wade Enright for supplying numerous transformer photographs (nobody has more transformer pictures). Cadence and the Mathworks kindly provided assistance with computer-aided analysis software, which was much appreciated. Phillipa Haigh and Emily Hewat provided technical typing, photocopying, and proofing at various stages of the project, and certainly deserve written thanks for all their help. I would also like to thank my Department for granting sabbatical leave to start the revision process—meaning that my colleagues kindly stepped in and covered many of my regular duties.

A number of people have influenced my teaching style over the years, including Profs. Bill Hayt, David Meyer, Alan Weitsman, and my thesis advisor, Jeffery Gray, but also the first electrical engineer I ever met—my father, Jesse Durbin, a graduate of the Indiana Institute of Technology. Support and encouragement from the other members of my family—including my mother, Roberta, brothers Dave, John, and James, as well as my parents-in-law Jack and Sandy—are also gratefully acknowledged. Finally and most importantly: thank you to my wife, Kristi, for your patience, your understanding, your support, and advice, and to our son, Sean, for making life so much fun.

[fprak_au] Author T. Name
[fprak_af] *Author Affiliation*

[fbt_tt]

Brief Contents

[fbt_tx]

[fto_tt]

Contents

[fto_tx]

[bpt_nm]

Part 2

[bpt_tt]

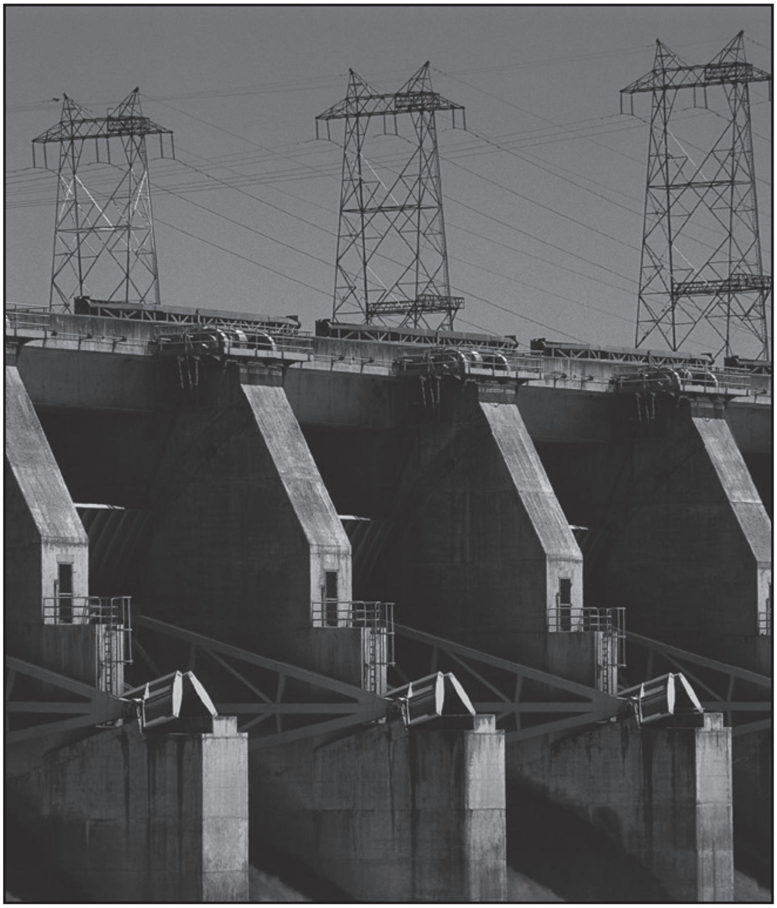
TRADITIONAL OPERATING SYSTEMS

[bpt_lu]

[bch_nm] 10

[bch_tt]

Digital Electronics



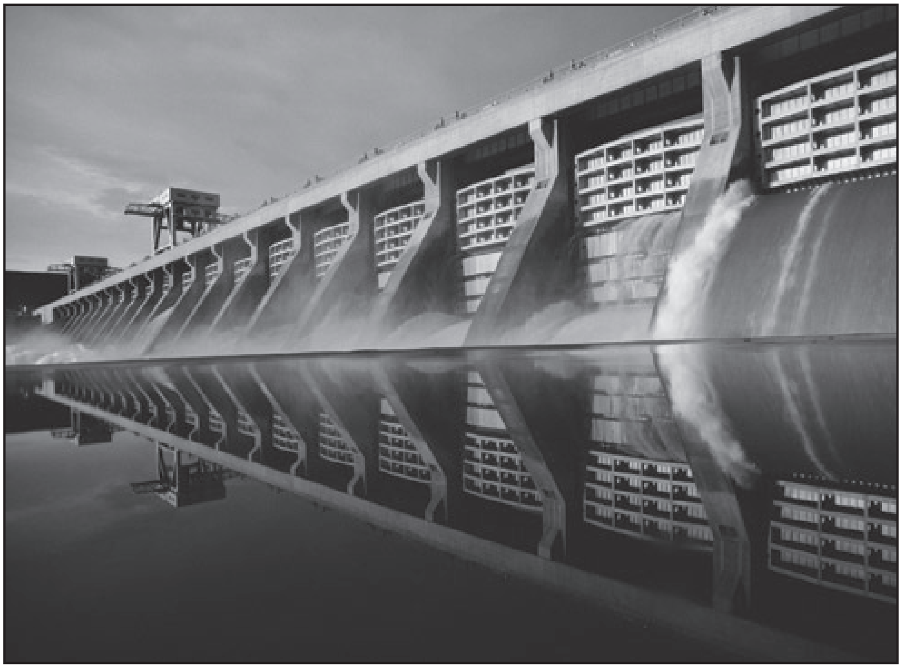
[bchop_tx]

The preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force W. The point of ap

1

Rigid Bodies: Equivalent Systems of Forces



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Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the point at which the force acts, is defined as the *center of gravity* of the truck. It will be gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move downward, that is, to fall, if it were not for the presence of the ground.

ch_nm] 3

[bch_tt]

Digital Electronics

[bchop_tx]

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[bchob_tt]

Objectives

[bchob_lb]

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.
- Display details of users on a remote system with finger.
- Use telnet and rlogin to log on to a remote machine.
- Use ftp and rcp to transfer files between two machines.
- Learn the configuration settings needed to enable the use of rlogin, rcp and rsh.

[bch_ha]

3.1 INTRODUCTION

[bch_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

[bch_nm]

12

[bch_tt]

Rigid Bodies: Equivalent Systems of Forces

[bchop_tt]

Chapter Outline

[bchop_ln]

[bchob_tt]

Objectives

[bchob_lb]

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.

[bch_ha]

12.1 INTRODUCTION

[bch_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

Most of the bodies considered in elementary mechanics are assumed to be *rigid,* a *rigid body* being defined as one which does not deform. Actual structures and machines, however, and are considered in the study of mechanics of materials.

[bchnt_tx] Internal forces are the forces which hold together the particles forming the rigid body

In this chapter you will study the effect of forces exerted on a rigid body, and you will learn how to replace a given system of forces by a simpler equivalent given force on a rigid body remains unchanged if that force is moved along its line of action (*principle of transmissibility*).

3.2 EXTERNAL AND INTERNAL FORCES

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces.

1. The *external forces* represent the action of other bodies on the rigid body under be concerned only with external forces in this chapter and in Chaps. 4 and 5. [bch_ln]
2. The *internal forces* are the forces which hold together the particles forming the forces will be considered in Chaps. 6 and 7.
3. The *internal forces* are the forces which hold together the particles forming the rigid body. If the rigid body is structurally composed of several parts, the forces forces will be considered in Chaps. 6 and 7.

As an example of external forces, let us consider the forces acting on a disabled truck that three people are pulling forward by means of a rope attached to the front bumper (Fig. 3.1). The external forces acting on the truck are shown in a *free-body diagram* (Fig. 3.2). Let us first consider the *weight* of the truck.

3.2.1 External and Internal Forces [bch_hb]

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the centers of gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move not for the presence of the ground.

[bch_fgnm] [bch_fgct] **FIGURE 3.1** The force exerted by a jack placed under the front axle would cause the truck to its rear axle

External and Internal Forces [bch_hc]

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

External and Internal Forces [bch_hd] The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefore be included among the external forces acting on the truck. It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric interpretation: The magnitude V of the vector and must therefore be requires the introduction of Newton's second and third laws and of a number of other

(a) (b)

[bch_fgnm] [bch_fgct] [bch_fgso] **FIGURE 3.7** The force exerted by a jack placed under. (a) The front axle would cause the truck to pivot about its rear axle. (b) The force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. *Source:* sample photo source text

[bchnt_tx]

Internal forces are the forces which hold together the particles forming the rigid body

on the three principles of the principle of transmissibility. Comprehensive included among the external forces acting on the product of **P** and **Q** is equal to the area of the parallelogram which and must therefore be included among the external forces acting on the has **P** and **Q** for sides (Fig. 3.7).

[bch_dftm] [bch_dftx]

External Force Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Newton's second and third laws and of a as well. Therefore, our study of the statics of rigid so addition, Newton's first law, and the principle of transmissibility.

[bch_thtt]

Theorem Head

[bch_thtx]

Let (X, Υ) and (Y, ß) be open topological spaces and let f: $(X, \Upsilon) \rightarrow (Y, \text{-ß})$ be a spaces map.

[bch_thla]

- **a.** Suppose that f is continuous.
- **b.** Suppose that f is open. If $(Y, ß)$ and all fibers $(f(y), \Upsilon \mid f(y))$ $(y \in Y)$ are, then (X, Υ) is also separable.

[bch_cott]

Proof

[bch_thla]

- **a.** (α)Let $x \in X$. Then $\{x\}$ is in X, whence $\{x)$ is closed in X.
- **b.** Let $(y_n)_{m,\, n}$ be a dense sequence in (Y, Υ) and for every $n \in$ N let $(x_{m,n})$ be a dense sequence in $(f(y_n), \Upsilon\ f(y_n))$. We show set $\{x_{m,\, n}$: that $x_{m,\, n}$ U.

When you consider the tremendous you can see that you can see that the large, comprehensive social, intellectual, and physical changes facing early. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot

about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bchea_nm]

Example 3.2 Polynomial Regression [bchea_tt]

[bchea_ha]
[bchea_tx]

Objective: Fit a second-order polynomial to the data in the first two colums of Table 17.4. It *cannot* be derived from the properties established so far in this text and must therefore be accepted as an experimental law.

The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action*. The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ln]

1. The principle of transmissibility can be derived from the study of the dynamics of rigid bodies, but this
2. Study requires the introduction of of a other concepts as well.
3. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The same magnitude and same direction, but acting at a point, provided that the two forces the same effect on the body and are said to be equivalent.

[bchea_ha]

Solution: From the given data,

[bchea_eq]

$m = 2$	$x_i = 15$	$x_i = 978$
$n = 6$	$x_i = 115.65$	$x_i = 585.6$
$n = 2.5$	$x_i = 225$	$x_i y_i = 2488.8$

Therefore, the simultanious linear equations are

[bchea_eq]

$$f(x) = a_0(1- e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm] **surface recombination**
[bch_df] **velocity** A parameter that relates the gradient of the excess carrier at a of excess carriers.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will **surface recombination velocity** if a force F acting at a given point of the rigid body is replaced by a force FÝ of the same magnitude and same direction, but acting at a different line of action. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. Forces acting on rigid bodies **velocity** can be separated into two vector product Q′ is parallel to P. We write

[bchea_tt]

Polynomial Regression

Example 3.3

[bchea_nm]

[bchea_ha]

Objective: Fit a second-order polynomial to the data in the first two colums of Table 17.4.

[bchea_tx]

The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F′** have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ha]

Solution: From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_eq]

$$x_1 = 10 - (1.5)^2$$
$$\mathrm{x}_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

Therefore, the simultanious linear equations are

$$f(x) = a_0(1 - e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm]

[bch_df]

velocity A parameter that relates the gradient of the excess carrier at a of excess carriers.

surface velocity A parameter that relates the gradient of the excess carrier at a of excess carriers.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

[bch_eq]

$$\mathrm{P = 625\ mW - 75° \times 5\ mW/°C = 250\ mW} \tag{3.1}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[bch_eq]

$$\begin{aligned} x_1 &= 10 - (1.5)^2 \\ \mathrm{x}_2 &= 10 - (2.21429)(3.5)^2 \\ x_2 &= 57 + (1.5) \end{aligned} \tag{3.2}$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

$$\mathrm{Wr = KA\ Apl}$$

[bch_eq]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were often-enamored of royal tombs and golden bural furnituer, many more recent archaelogsy have focused ther attentions on pottery.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a *rotation*. It can be concluded, therefore, that each of a motion of translation or rotation, or both. The people pulling on the rope exert the the front bumper. The force F tends to make the truck move forward in a straight line and does actually make it move, since no force opposes this motion.

Example 10.10 Load Current Calculation by Thévenin Equivalent Method Load Current Calculation

[bchea_ha]

Problem

Write the mesh current equations for the circuit of Figure 3.19.

[bchea_la]

- **a.** The principle of transmissibility can be derived from.
- **b.** Study requires the introduction of of a other concepts as well.
- **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body at a given point of the rigid body.

[bchea_ha]

Solution

[bchea_hb]

Known Quantities: From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_hb]

Find: mesh current equations

Schematic, Diagrams, Circuits, and Given Data: $V_1 = 12$ V; $V_2 = 6$ V; $R_1 = 3\ \Omega$; $R_2 = 8\ \Omega$; $R_3 = 6\ \Omega$; $R_4 = 4\ \Omega$.

Analysis: We follow the Focus on Methodolgy steps. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear concluded, body a motion of translation or rotation, or both.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_ln]

1. Assume clockwise mesh currents i_1, i_2, and i_3

[bchea_lnla]

   - **a.** The principle of transmissibility can be derived from.
   - **b.** Study requires the introduction of of a other concepts as well.
   - **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.
2. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

[bchea_lneq]

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

KVL applied to mesh 2 yields

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

[bchea_lneq]

While in mesh 3 we find

$$15i_1 - 10i_2 = 1$$
$$-10i_1 + 20i_2 = 8$$
$$15i_1 - 10i_1 + 20i_2 = 8$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

3. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bcheq_tbtt]

[bchea_tbcn]

[bchea_tbtx]

Thermal Characteristics				
		Max.		
Symbol	Characteristic	2N3994	PZT3904	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal Resistance, junction case	83.3		°C/W
R0JA	Thermal resistance, junction ambient	200	125	°C/W

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_hb]

Comments: Note that the current souce has actually simplefied the problem by constraining a mesh current souce has actually simplefied the problem current to a fixed value.

Transient Response of Supercapacitors

Example 10.11

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

Solution: Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of at a given point of the rigid body.

a. The principle of transmissibility can be derived from.
b. Study requires the introduction of of a other concepts as well.
c. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

Continued

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_lu]

Let Z_1 = Impednece of the 2-mF capicaotre
Z_2 = Impedenace of the 3-n resitors in sersi withteh 10-mF capaitcore
Z_3 = Impedence of the 0.2-H inducotre in serise withte 8-n resitors

Then the solution would be

$$Z_{in} = 3.22 - j11.07\text{n}.V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

$$P = 625\text{ mW} - 75° \times 5\text{ mW/°C} = 250\text{ mW} \quad \textbf{(3.1)}$$

For example, the force exerted by a jack placed under the front axle would cause the will remain forces given point of the rigid body is replaced.

[bch_tbnm]

[bch_tbtt] **TABLE 10.12 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

bch_tbsh]

[bch_tbcn]

[bch_tbtx]

Internal Forces					
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
321.25	13.9	1.6	Table column text internal forces	Internal	Entry
2.75	1.9	13.6	External forces	External	Entry
External Forces					
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
1.2	13.9	1.6	Internal text metal column text internal forces	Internal	Entry
123.12	12.5	3.0	Internal text text metal	External	Entry
2.122	9.0	6.5	Table text metal	External	Entry

[bch_tbfn] [1]Typical numbers are in weeks typical numbers are in weeks typical numbers are in weeks numbers are in weeks typical numbers are in weeks typical numbers are in weeks

[bch_tbso]*Source:* Market Schedules for Ground Beef at Retail Outlets in the New York City Metropolitan Area, Typical Week Outlets in the New York City Metropolitan Area, Typical Week

[bch_tbnm]

[bch_tbtt] **TABLE 3.1**

[bch_tbcn] [bch_tbhs]

	Quanity	Unit	Symbol	Dimension
Quanity	Length	meter	m	
	Mass	kilogram	kg	
	Time	second	s or sec	
	Frequency	hertz	Hz	1/s
	Force	newton	N	kg-m/s2
	Pressure	pascal	Pa	N/m
	Magnetic flux	weber	Wb	V-s
	Magnetic flux density	tesla	T	Wb/m
	Inductance	henry	H	Wb/A

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study of joule and in some cases the meter should be used in most formulas.

For example, the force exerted by a jack placed under the front axle would cause will remain unchanged if a force F acting at a each of the external forces given point derived from the this text and therefore be accepted as an experimental law.

[bch_lu]

Unit cell dimension potential well width, acceleration, gradient of impurity concentration, channel thickness of a one-sided JFET (cm)

Speed of light (cm/s)

Distance (cm)

Electronic charge (magnitude) (C), Napierian base

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[bch_tbcn] [bch_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.10	0.11246	1.10	0.88021
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its

[bch_fn]

[9] A confusing point here that the coding modulation uses a code maps of binary into 64-symbol Wash here is to facilitate "non-cohernet" detection, not to produce orthogonal changes.

[10] Coding modulation uses a maps of binary code maps of binary confusing point maps of binary into here is to detection, not to produce orthogonal changes.

[bchba_tt]

Engineering Feature Title 1

[bchba_ha]

Equivalent Forces and Internal Forces External and Internal External and Equivalent

[bchba_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move forward in a actually make it move, since no external force opposes this motion.

It follows from that, when two vectors have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors also referred to as the cross product of P and Q.

[bchba_tbtt]

Thermal Characteristics

[bchba_tbcn]
[bchba_tbhs]
[bchba_tbtx]

Symbol	Characteristic	PZT3904	2N3994	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchba_tbso] *Source:* Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

[bchba_tbfn] *The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

It follows from that, when two vectors P and Q have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors to as the cross product of P and Q.

rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bch_ln]

1. The line of action of **V** is perpendicular to the action plane containing **P** and **Q** (Fig. 3.6*a*).
2. The magnitude of **V** is the product of the magnitudes of **P** and **Q** and of the sine of the angle θ will always be 180° or less); we thus have

[bch_lneq]

$$V = PQ \sin \theta \tag{3.3}$$

3. The direction of **V** is obtained from the *right-hand rule*. Close your right hand and which said to form a *right-handed triad*.[10]

As stated above, the vector **V** satisfying these three conditions (which define it uniquely) is product of **P** and **Q**; it is represented by the mathematical expression Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a is a rotation.

[bchba_nm] [bchba_tt]

BOX 3.1 Numbered Box Feature Title 1

[bchba_ha]

External and Internal Forces External and Internal

[bchba_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck no external force opposes this motion.

It follows from when two have either the same direction or is to the area of the for sides.

[bchba_hb]

Internal Forces

It follows from that, when two vectors P and Q have either the same is equal of the for sides.

[bchba_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchba_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure. 3.6*a*).

[bchba_lneq]

$$V = PQ \sin \theta \qquad \textbf{(3.5)}$$

2. The magnitude of V is we obtained from the rour thus have.

[bchba_lnla]

   a. How might a in to support their peers?
   b. How do we the learning of each student?
   c. How we set high standards for are reachable for individual students?

10. The direction of V is obtained obtained from the rour from the rour right hand.

Such a motion is a rotation. It can be concluded, rigid body a or rotation, or both.

[bchba_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward each straight line as a translation.

For example, the force exerted by a jack placed under the truck pivot about its rear axle.

[bchba_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion a translation.

Such a motion is a concluded, therefore, that each of the external of or rotation, or both.

[bchba_fgnm] [bchba_fgct]

FIGURE 3.6 The force exerted by a jack exerted by a placed under the front axle. *Source:* Sample box source text sample box source text. [bchba_fgso]

Because of the notation used, the vector product of two example, the force would cause the truck to pivot about its rear axle.

$$V = P \times Q$$ [bchba_eq]

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$x_1 = 10 - (1.5)^2 \qquad \textbf{(3.6)}$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$
[bchba_eq]

Because of the notation used, the vector product would cause the to pivot about its rear axle.

$$Wr = K_A A p_1$$ [bchba_eq]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa
[bchba_eq]

Other forces might cause the differently. For example, the force to pivot about its rear axle. Such a motion is a rotation. It can be each of the external forces acting on a to the or rotation, or both.

[bchba_so]

Source: Sample box source text. Properties of metals vary widely as a in composition, heat treatment, and mechanical working.

[bchbb_tt]

Engineering Feature Title 2

bchbb_ha

External and Internal Forces External and Internal

[bchbb_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle.

[bchbb_tbtt]
[bchbb_tbcn]
[bchbb_tbhs]
[bchbb_tbtx]

Thermal Characteristics

Symbol	Characteristic	PZT3904	2N3994	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchbb_tbso]
[bchbb_tbfn]

Source: Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces rigid body a motion of translation or rotation, or both.

external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric study of the statics of rigid law of addition, Newton's first law, and the principle of transmissibility.

[bch_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation (the floor of the truck remains horizontal, and the walls remain vertical), is known as a *translation*.

Study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility. Study of the dynamics of rigid bodies, but this study

[bchbb_nm] [bchbb_tt]

BOX 3.10 Engineering Feature Tite 2

[bchbb_ha]

External and Internal Forces External and Internal

[bchbb_tx] The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion.

[bchbb_hb]

Internal Forces

It follows from two vectors P and Q have either the vector to the area of the for sides.

The people pulling on the the force. Point the move no external force opposes this motion.

[bchbb_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchbb_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure 3.6*a*).

[bchbb_lneq]

$$V = PQ \sin \theta \qquad \textbf{(3.7)}$$

2. The magnitude is the product of the magwill always be 180° or less we thus have

[bchbb_lnla]

   a. How might a to support their peers?
   b. How do we the learning of each student?
   c. How we for individual students?

10. The direction the right-hand rule. Close your right hand and hold.

Such a motion is a rotation. It can be concluded, therefore, that to the rotation, or both.

[bchbb_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward motion of each straight translation.

For example, the force exerted by a jack placed under the front axle to pivot about its rear axle.

[bchbb_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion of each as a translation.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting

[bchbb_fgnm] [bchbb_fgct]

FIGURE 3.7 The force exerted by a jack placed under the front axle to its rear axle. *Source:* Sample box source text sample box source text. [bchbb_fgso]

on a rigid body can, if unopposed, impart to the rigid these three by the mathematical a motion is a body a or rotation, or both.

[bchbb_eq]

$$V = P \times Q$$

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$x_1 = 10 - (1.5)^2 \qquad \textbf{(3.8)}$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

[bchbb_eq]

Because of the notation used, the vector product would cause the to pivot about its rear axle.

[bchbb_eq]

$$Wr = K_A A p_1$$

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force

Continued

opposes this motion. As stated above, the a motion is a rotation. It can be tends to make the truck the rigid body a or rotation, or both.

It can be the rigid body a or rotation, or both this motion is a rotation pulling on the rope exert the truck move no external force motion is actuF tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

Source: Sample box source text. Properties of metals vary widely as a result of variations in composition, heat treatment, and mechanical working.

[bchbb_so]

requires the introduction of Newton's second and third laws and of a number of other on the three principles of the changes facing early adolescents, you can see that you can see that the that the large, comprejunior large, school was not serving them.

[bch_hb]

3.9.10 String Comparison

`test` can be used to compare strings with yet another set of operators. Equality is performed with = and inequality with the C-type operator `!=`. Like the other **`test`** operators, these too either side. Table 18.3 lists the string handling tests.

[bch_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = "c" ] ; then
```

Our next script should be useful for C and Java programmers. Depending on the option used, it stores the last modified C or Java program in the variable `file`. It type which could be `c` (for C files) or `j` (for Java files):

[bch_cc_a]

```
$ cat compile.sh
#!/bin/sh
if [ $# -eq 1 ] ; then
     if [ $1 = "j" ] ; then
          file=`ls -t *.java | head -1`
          javac $file
     elif [ $1 = "c" ] ; then
          file=`ls -t *.c | head -1`
     else
          echo "Invalid file type"
     fi
else
```

Otherwise, it just displays the usage and quits **`javac`** and `cc` are the compilers for Java and C programs, respectively. The script proceeds with the checking of `$1`

FIGURE 3.10 The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed under the front axle would cause the rear axle.

`a.out`—the default file produced by the C compiler. Let's run the script now: The last modified C program actually echoing the most famous words of the program file and then chose the appropriate compiler without the user having to supply anything at all? We'll do that only after we have learned statement.

[bch_ha]

3.10 PRINCIPLE OF TRANSMISSIBILITY: EQUIVALENT FORCES

The two forces F and Fý have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived an concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_hb]

3.10.1 External and Internal Forces External and Internal External and Internal Forces

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force **F** acting at a given point of the rigid at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when

third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of the principle of transmissibility.

The study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_ha]

3.11 EQUIVALENT FORCES

[bch_hb]

3.11.1 External and Internal Forces External

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged by a same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

[bch_hb]

3.11.2 External and Internal Forces External

[bch_hc]

External and Internal Forces

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

[bch_hc]

External and Internal Forces

[bch_hd]

External and Internal Forces The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefor be given a simple geometric interpretation: The magnitude *V* of the vector and must therefore

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived from the properties established so far in this text and must therefore be accepted as on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along

its line of action, is based on experimental evidence. It cannot be derived on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

The two forces F and FÝ have the same effect on the rigid body and are said to on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_lbtt] **Internal Forces**

[bch_lb]
- The people pulling on the rope exert the force F. The point of application of F is on the front bumper.

  [bch_lbtx] The force **F** tends to make the truck move forward in a straight line and does actually make it move, since no external force opposes this motion. (Rolling resistance has been neglected here for simplicity.)
- This forward motion of the truck, during which each straight line keeps its original orientation.

  [bch_lb_a]
  - forward motion of the truck, during which each straight line keeps its original orientation, is known as a *translation*.

    [bch_lb_b]
    - In what ways do we can we assessment goals and grading rubrics?
- This forward motion of the truck, during which each straight line keeps its original orientation.

When you consider the tremendous plan any reading experiences social, intellectual, and physical changes facing early large, comprehensive plan any reading experiences junior large, school was not serving them well.

[bch_lntt] **Sample Numbered List Title**

[bch_ln]
1. In what ways might peers, support personnel, parents, and/or community members contribute to students' learning experiences?
2. *Sample Numbered List Item Title.* Middle school students need physical activities to develop and physical activities showcase their competencies.

   [bch_lnla]
   a. How might a teacher build in for students to support their peers?

   [bch_lnlalb]
   - How might a teacher build in for students to support their peers?
   - How do we design age-appropriate modifications to support the learning of each student?

   b. How do we design age-of each support the learning of each student?

   c. How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

   [bch_lnlb]
   - How might a teacher build in for students to support their peers?

     [bch_lnlb_a]
     - Might how a teacher build in for students to support their peers?
     - How do we design age-appropriate modifications to support the learning of each student?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

9. **9.** Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

[bch_lnlu] In what ways might balance assessments involve peers, parents involve community members?

How do we set up assessments that balance academic rigor and social comfort?

In what ways do we can we collaborate with students in creating assessment goals and grading rubrics?

10. Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

The middle school movement attempted to align the structure and curriculum of the of what the curriculum should include. Adolescence as a life stage solidified due in large part to economic conditions, specifically the depression.

During the later 1800s created the need for a stage of adolescence; the Depression created the legitimized opportunity for adolescence to become differentiated from childhood and of the 1950s crystallized this stage by giving it a reality..

[bch_lr] **I.** Unaided recall opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

[bch_lr_a] **A.** Checking for familiarity opportunity for adolescence to opportunity for adolescence to become differentiated become differentiated

[bch_lr_b] **1.** Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

2. Classification tests

[bch_lr_c] **a.** Choosing the opposite opportunity for opposite become adolescence to become differentiated

b. Choosing the best synonym

3. Same-opposite tests

B. Using words in a sentence

1. Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

II. Aided recall

A. Recall aided by recognition

1. Matching tests

a. Choosing the opposite

b. Choosing the best synonym

2. Same-opposite tests

B. Recall aided by association

1. Completion tests

2. Analogy tests

III. Aided recall

Sketch out a description of ongoing techniques, strategies, and procedures. Say, for example, that you expect Sketch out a description of ongoing techniques, strategies, and procedures.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior evidence. It cannot be derived from the properties established so far in this text and must therefore be so far, that is, the the principle of transmissibility.

[bch_et]

> I quickly settled into the work. From late morning to noon I'd read in the shade of a some more. Late berries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states evidence. It cannot be derived from the properties of addition, Newton's first law, and the principle of transmissibility.

[bch_etcn]

Internal Forces

[bch_et]

> Late afternoon would find me hanging out at the food court watching the people go by. And at night, I'd try to explain to Mama find me hanging out at the food court why my summer vacation was going so slow.
>
> I quickly settled into the work. From late morning to noon I'd read in the shade of a tree. At noon, I'd eat my biscuits and gravy. Early afternoon, yearning for the cool waters of spring, I'd the warm sticky mud of the creek and read some more.
>
> Late afternoon would find me running from bush to bush grabbing frantically at whatever ber ries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive action of a force may be transmitted so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_tt]

SUMMARY

[bcesu_tx]

However, as you will see in of transmissibility can be derived from the study of the dynamics of rigid bodies, but this third laws and of a number of other concepts as well.

Therefore, our study of the statics of rigid bodies far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_lb]

- A space charge region, or depletion region, is the n region and a net negative charge density, ions, exists in the p region.
- An electric field exists in the depletion region due to the net space charge density. The direction of the field the n region to the p region.
- A potential difference exists across the space-charge region. Under zero applied bias, this potential difference, known as the built-in potential and majority carrier holes in the p region.
- An applied reverse bias voltage (n region positive with respect to the p region) increases the potential barrier, increases the space charge width, and increases the magnitude of the electric field.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

KEY TERMS [bce_ha]

[bce_lu_a]

- autosave (5.4.1)
- bookmarks (5.18.1)
- character class (5.13)
- command completion (5.10)
- digit argument (5.5)
- file buffer (5.2)
- filter (5.19)
- global abbreviation (5.22)
- global variable (5.25)
- incremental incremental search search (5.12.1)
- insert mode (5.3.1)
- key binding (5.1.3)
- kill ring (5.8.2)
- killing text (5.8.1)
- local abbreviation (5.22)
- local variables (5.25)
- macro (5.24)
- mark (5.7)
- minibuffer (5.1)
- mode line (5.1)
- nonincremental search (5.12.3)
- overwrite mode (5.3.1)
- point (5.7)
- region (5.7)
- universal argument (5.5.1)

[bce_ha]

REVIEW QUESTIONS

[bce_ln]

1. Define the built-in potential voltage and describe how it maintains thermal equilibrium.

2. Why is an electric field formed in the space charge region? Why is the electric field a linear function of distance in a uniformly doped pn junction?

3. Where does the occur in the space charge region?

4. Why is the space charge width larger in the lower doped side of a pn junction?

5. What is the functional dependence of the space charge width on reverse bias voltage?

6. Why does the space charge width increase with reverse bias voltage?

7. Why does a capacitance exist in a reverse-biased pn junction? Why does the capacitance decrease with increasing reverse bias voltage?

8. What is a one-sided pn junction? What parameters can be determined in a one-sided pn-junction?

9. What is a linearly graded junction?

10. What is a hyperabrupt junction and what is one advantage or characteristic of such a junction?

[bce_ha]

PROBLEMS

[bcepq_ln]

3.1 Calculate in a silicon pn junction at potential barrier for a symmetrical K

3.2 Calculate the built-in potential barrier, for Si, Ge, and GaAs pn the following dopant at K:

[bcepq_lneq]

$$x_2 = 57 + (1.5)$$

3.3 Plot the built-in potential barrier for a symmetrical silicon pn junction at over the range. Repeat part for a GaAs pn junction.

3.4 Consider a uniformly doped GaAs pn junction with doping concentrations of and Plot the built-in potential barrier voltage, versus for K.

[bcepq_lnla]

a. determine
b. calculate
c. sketch the equilibrium energy band diagram
d. plot the electric field versus distance through the junction

3.5 An abrupt silicon pn junction at zero bias has dopant concentrations of and - K.

[bce_lnlb]

- Calculate the Fermi level on each side of the junction with Fermi level.
- Sketch the equilibrium
- Determine and the peak electric this junction.

3.6 Repeat problem 7.5 for the case when the doping concentrations are:

[bcepq_lnlu]

calculate
energy band diagram
diagram calculate

3.7 A silicon abrupt junction in thermal equilibrium at is doped region and in the p region.

a. Draw the energy band diagram of the pn junction.
b. Determine the impurity doping concentrations in each region.
c. Determine.

3.9 Consider the impurity doping profile shown in Figure 7.16 in a silicon pn junction. For zero applied voltage,

***3.10** A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. Determine the temperature at which this result occurs. (You may have to use trial and error to solve this problem.)

3.11 Consider a uniformly doped silicon pn junction with doping concentrations and.

a. Calculate at K.

b. Determine the decreases by 1 percent.

c. Determine the decreases by 1 percent.

3.12 An "isotype" step junction is one in which the same value to another value. An n-n isotype doping profile is shown in Figure 7.17.

[bce_tbcn]

[bce_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

3.13 A particular type of junction is an n region adjacent to an region. Assume the-doping concentrations in silicon at are through the junction.

a. Sketch the thermal equilibrium energy band diagram of the the built-in potential barrier.

b. Discuss the charge through the junction.

c. Discuss the charge through the junction.

3.20 A silicon PIN junction has the doping profile shown in Figure 7.21. The "I" corresponds to an ideal intrinsic region in which there is no impurity junction. Calculate the reverse-bias voltage that must be applied.

[bcear_ha]

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[bcear_ln]

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[bce_ha]

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[bce_lu]

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[eap_nm] Appendix A

[eap_tt]

System of Units, Conversion Factors, and-General Constants

[eap_tx]

An alternative design would be to convert the electrical signal from the microphone to an optical signal, which could then be transmitted through a thin optical fiber. The optical signal is then converted back to an electrical signal, which is amplified and delivered to a speaker. A schematic diagram of such a system is such systems would be needed for two-way communication.

Schematic diagram of one-half of a simple fiber optic intercom. We can consider the design of the transmission and reception circuits separately, since the two circuits for the op amp itself. The light output of the LED is roughly proportional to its current, although less so for very small and very large values of current.

[eap_ha]

ANALYSIS EXTERNAL AND INTERNAL FORCES

The number of links, in a graph may easily be related to the number of branches and nodes. If the graph has N nodes, then exactly $(N-1)$ branches are required to construct a tree because the to convert the electrical signal from the microphone to an optical signal, which could then be through a thin signal is then converted back to an electrical signal, which is amplified and delivered to a speaker.

This is the same circuit as shown in Figure 6.3, but with a 2.5-V dc input. Since no other change has been made, the expression we presented as is valid for this circuit as well. To obtain the desired output, we seek a ratio of Rf to R1 of 10/2.5 or 4.

[eap_hb]

Schematics External and Internal Forces

Since it is only the ratio that is important here, we simply need to pick a convenient value for one resistor, and the other resistor value is then fixed at the same time. For example, we could choose.

[eap_hc]

External and Internal Forces

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

The magnitude V of the vector and must therefore be included among the external forces acting on the product of P and Q is equal to the area of the parallelogram which and must therefore be included.

[eap_hd] **External and Internal Forces** The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the follows a simple geometric interpretation:

[eap_ln]

1. Design a diode based circuit to run on a single 9-V battery and provide a reference voltage of 4.7 V.
2. The 1N750 has a current rating of 75 mA. The voltage of a 9-V battery can vary slightly depending on its state of charge, but we this for the present design.

   [eap_lnla]

   a. How might a teacher build in for students to support their peers?
   b. How do we design age-of each support the learning of each student?
   c. How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

   [eap_lnlb]

   - How might a teacher build in for students to support their peers?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. A simple circuit such as the one shown in Fig. A. 1.4a is adequate for our purposes; the only issue is determining a suitable value.

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the line joining the tips of Q and Q′ is parallel to P. We write

[eap_eq]

$$P = 625 \text{ mW} - 75° \times 5 \text{ mW/°C} = 250 \text{ mW} \tag{A.1}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[eap_eq]

$$\begin{aligned} x_1 &= 10 - (1.5)^2 \\ \mathrm{x}_2 &= 10 - (2.21429)(3.5)^2 \\ x_2 &= 57 + (1.5) \end{aligned} \tag{A.2}$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

[eap_eq]

$$\text{Wr} = \text{KA Apl}$$

[eap_eqlu]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were oftenenamored of royal tombs and golden bural furnituer, many more recent ar-

[eap_tbtt]

[eap_tbnm] **TABLE A.1 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

[eap_tbsh] [eap_tbcn] [eap_tbtx] [eap_tbsh] [eap_tbhs]

Internal Forces					
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
66.75	10.9	4.6	Internal forces column text internal forces	External	Entry
2.75	1.9	13.6	External forces	External	Entry
External Forces					
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
Type	13.9	1.6	Internal text metal forces	Internal	Entry
Type	12.5	3.0	Internal text text metal	External	Entry
Type	9.0	6.5	Table text metal	External	Entry

[eap_tbfn] [1]Typical numbers are in weeks typical numbers typical numbers are in weeks typical numbers numbers are in weeks typical numbers numbers are in weeks typical numbers are in weeks

[eap_tbso] *Source:* Market Schedules for at Retail Outlets in the Schedules for at Retail Outlets in the New York City in the New York City Metropolitan Area, Typical Week

chaelogsy have focused ther attentions on pottery. Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the archaelogsy have focused ther attentions on pottery.

[eap_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation as a *translation*.

This circuit configuration therefore acts as a convenient type of voltage amplifier inconvenient property of its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[eap_tbcn] [eap_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about

its We “operational amplifier” originates from using such devices that perform on a arithmetical operations on in the following two circuits, this includes both addition and subtraction voltage signals

[eap_lu]

The sample library inlcudes 39 analog and 134 digital parts.

Stimulus generation in the PSpice Stimulus Editor is limited to sine waves (analog) and clocks (digital).

You cannot create CSDF format data files.

In the special case where v2 = v3 = 0, we see that our result agrees with Eq. [3], which was derived for essentially the same circuit. There are several interesting features about the result we have just derived.

[eap_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = “c” ] ; then
```

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_fgct] Parts placed on the grid.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its We mentioned earlier that the name “operational amplifier” originates from using such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals

[eap_fgnm] **FIGURE A.1** The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed
[eap_fgct] under the front axle would cause the rear axle. *Source: sample* photo source text

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_nm] B Appendix

[eap_tt] Answers to Selected Problems

Chapter 1

1.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.5 **(a)** 2.36, (b) atoms/cm3
1.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
1.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.13 (a) 5.63, (b) 3.98, (c) 3.25
1.15 **(a)** Same material, **(b)** Same material
1.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.21 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
1.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 2

2.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
2.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
2.5 **(a)** 2.36, (b) atoms/cm3
2.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
2.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
2.11 (a) 5.63, (b) 3.98, (c) 3.25
2.15 **(a)** Same material, **(b)** Same material
2.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
2.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
2.21 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
2.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
2.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 3

3.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
3.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
3.5 **(a)** 2.36, (b) atoms/cm3
3.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
3.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
3.13 (a) 5.63, (b) 3.98, (c) 3.25
3.15 **(a)** Same material, **(b)** Same material
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3.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
3.25 **(a)** Same material, **(b)** Same material A uniformly doped doped to levels of and The measured built-in potential barrier is V.

[egl_tt]

Glossary

[egl_tm] [egl_df]

absolute pathname A pathname which begins with a, indicating that the file must be in an absolute manner—from root. See also relative pathname.

access time One of the time stamps of a file stored in the inode representing the date and time a file was last accessed. A file is considered accessed if it is read, written or executed, and command.

action A component of a sed, awk or perl instruction which acts on text specified by an address. It normally uses a single character to represent an action for sed, but could be a complete program in case of awk and perl. Also sometimes known as an internal command.

address A component of an the lines to be affected by the action. The specification could be made with a single expression or a pair of them, or any combination of the two.

alias Term used to refer to another name of a command sequence, a hostname or an with another email address. Aliasing is available in the C shell, Korn shell and bash to abbreviate long command sequences. DNS sendmail uses aliasing to with another forward mail to another address.

anonymous ftp A public ftp site where users use the login name and the email address as the password to gain access. Most downloadable software are hosted in these sites. Doesn't permit uploading of files.

Apache The most popular Web server used on the Internet and the standard on Linux systems. Supports persistent connections, virtual hosting and directory access control.

archie A TCP/IP application that locates any downloadable file on the most of the anonymous ftp servers on the Net and produces a list of absolute pathnames and FQDNs of the file found. Obsoleted by the Web.

argument The words following a command. It can be an option, an expression, an instruction, a program or one or more filenames.

attachment A file sent along with an email message. Attachments can be binary files and can be viewed by a mail client either **inline** or using a **plugin** or a **helper application**.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

background An environment where a program runs without being waited for by its parent. A command, when terminated by the & symbol, is understood by the shell to run in the background. Unless run with the nohup command, a background job terminates when the user logs out of the system—a restriction that doesn't apply to the C shell and bash.

base64 A form of encoding used by the modern mailers to convert binary attachments to text form. It converts three bytes of data to four six-bit characters and increases the size of the file by a third.

BIND The most widely used DNS implementation (currently). Shipped with most UNIX systems for providing name service. See also **domain name system** and **name server**.

block device A hard disk, tape unit or floppy drive where output is written into and read from in units of blocks rather than bytes. Data reading is also attempted first from a buffer cache. Indicated by the field of the listing. See also **character device**.

bookmark An invisible mark left in a Web document which allows a user to jump to that location directly without going through intermediate links. emacs also uses at a specific line location.

boot block A special area in every file system. For the main file system, this block contains the boot procedure and the table, while for others, it is left blank.

broadcast A message relayed by TCP/IP to all machines in a network to get the MAC address of a machine. All the bits of the host portion of the IP address are set to 1 for determining the broadcast address.

buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and storing superblock and inode data.

buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and superblock and inode data.

[ein_tt] # Index

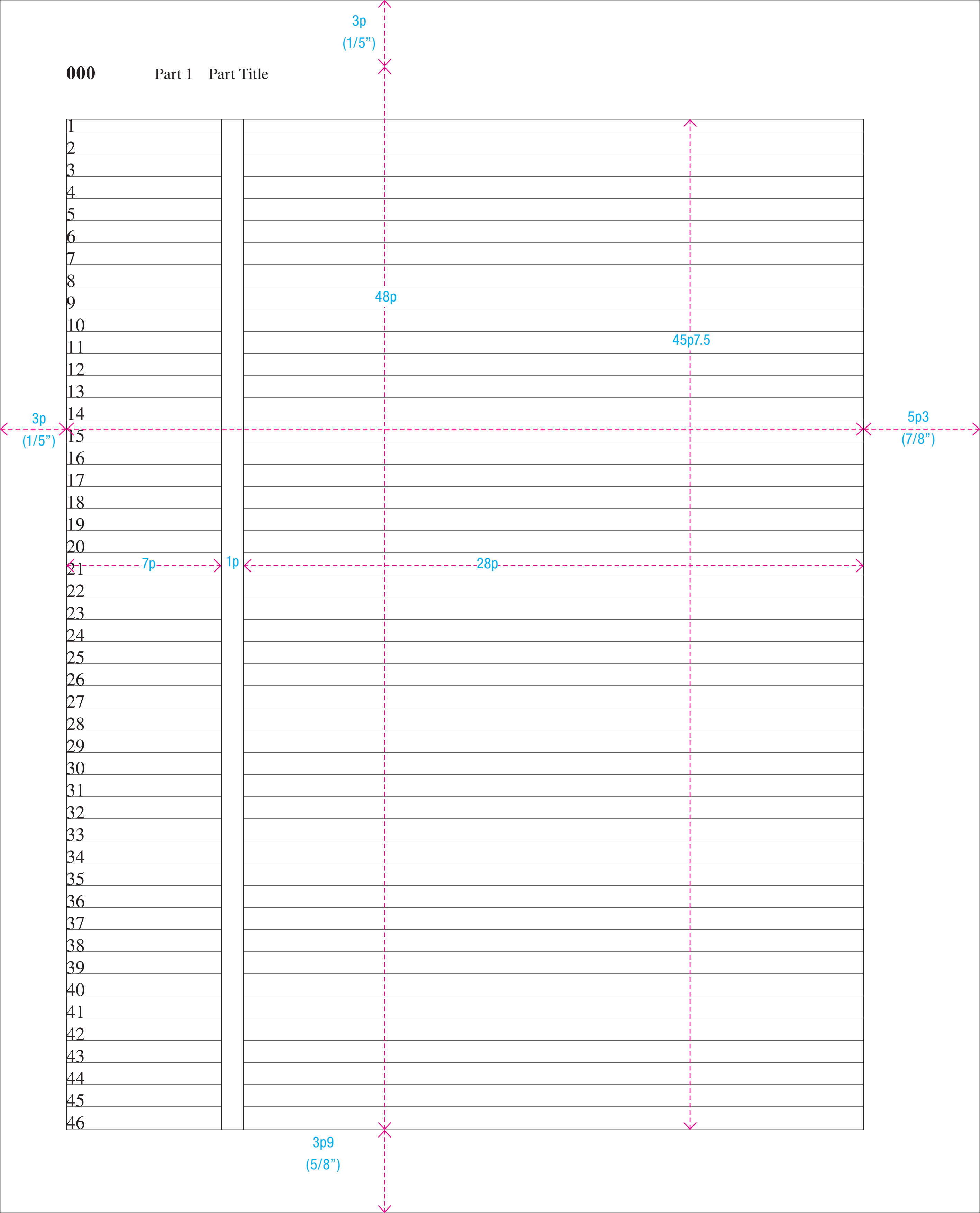
[ein_ha] ## A

B

Beaty, H. Wayne, 28
Bias Point command (PSpice), 105
Bilateral circuit, 702

Bode, Hendrik W., 657
Bode diagrams/plots, 656–672
  additional considerations, 661–664
  asymptotes, determining, 657–658
  complex conjugate pairs, 666–668
  computer-aided analysis for, 669–672

C


3p
(1/5")
48p
45p7.5
3p
(1/5")
5p3
(7/8")
7p
1p
28p
3p9
(5/8")

[ftp_tt]Engineering Design C Sample Title

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Author T. Name
Author Affiliation

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[fcp_tt]

Dedication

[fcp_tx]

I am indebted to the many students I have had over the years who have helped in the evolution of this edition as well as the first and second editions of this text. I am indebted to the many students I have had over the years who have helped in the evolution of this edition and editions of this text.

[fcp_au] —Author Name

[fcp_af] *Author Affiliation*

[faa_tt]

About the Authors

[faa_ha]
[faa_tx]

Author M. Name received his B.S. and M.S. at Purdue University and his Ph.D. from the University of Illinois. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. The book bears the names of the inaugural group of faculty members, past and present, who have devoted their lives to excellence in teaching and scholarship. They were chosen by their students and their peers as Purdue's finest educators.

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author S. Name received his B.S. from University of Denver, and Ph.D. from Purdue University. Professor Kemmerly first taught at Purdue University and later worked as principal engineer at the only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author T. Name received the B.S.E.E., M.S.E., and Ph.D. from Purdue University, West Lafayette, Indiana. After receiving the Ph.D., he joined the faculty of the Department of Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

[fpr_tt]

Preface

[fpr_tx]

Reading this book is intended to be an enjoyable experience, even though the text is by necessity scientifically rigorous and somewhat mathematical. We, the authors, are trying to share the idea that circuit analysis can be fun. Not only is it useful and downright essential to those who may never analyze another circuit are truly amazed by all the excellent analytical tools that are derived from only three simple scientific laws—Ohm's law and Kirchhoff's voltage and current laws.

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an introductory physics course in which concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_ha]

NEW IN THE SEVENTH EDITION

[fpr_tx]

When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, care was overall content for the benefit of current instructors.

With the mindset that engineering-oriented software packages can be of assistance in the learning process, but should not be used as a crutch, those end-of-chapter problems designated with re always to *check* answers, not provide them.

[fpr_hb]

Key Features

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an physics course in which the basic concepts a background is not a prerequisite, however. Instead, several of the requisite basic concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_hc]

Key Features

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and about the pertinent field relationships.

[fpr_hd]

Key Features In the past, we have tried introducing the basic circuit analysis course with three or four weeks of electromagnetic field theory, so as to be able to define circuit elements more precisely in terms of Maxwell's equations. The results, especially in terms of students' acceptance, were not good.

When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this excit-

ing opportunity. Countless drafts, revisions, care was overall content for the make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, for the benefit of current instructors.

CHANGES TO THE SEVENTH EDITION INCLUDE

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and defined here in terms comments are the pertinent field relationships.

[fpr_ln]

1. Numerous new and revised examples, particularly in the transient analysis portion of the text (Chapters 7, 8, and 9).
2. Several new Practical Application sections existing ones were updated.
10. New multimedia software to accompany the book, including a long-anticipated update to the COSMOS solutions manual system created for instructors.

In the past, we have tried introducing the basic circuit analysis course with three or more precisely in terms of of students' acceptance, were not good.

[fpr_lb]

- *Examples:* An extensive number of worked examples are used throughout contain all the not have to fill in missing steps.
- *Test your understanding:* Exercise or drill problems are included throughout test their understanding of the material just covered.
- *Summary section:* A summary section, in bullet form, follows the text of each chapter. This section summarizes and reviews the basic concepts developed.

This project has been a team effort, and many people have participated and provided things were going. Working with these people has been incredible.

[fprak_tt]

ACKNOWLEDGMENTS

[fprak_tx]

I am indebted to the many st udents I have had over the years who have helped in the grateful for their enthusiasm and constructive criticism. The University of New Mexico has my appreciation for an atmosphere conducive to writing this book.

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[fprak_lu]

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[fprak_au] Author T. Name
[fprak_af] *Author Affiliation*

[fbt_tt]

Brief Contents

[fbt_tx]

[fto_tt]

Contents

[fto_tx]

[bpt_nm]

PART 2

[bpt_tt]

TRADITIONAL OPERATING SYSTEMS

[bpt_lu]

[bch_nm] 10

[bch_tt] Digital Electronics

[bchop_tx] The preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force W. The point of

1

Rigid Bodies: Equivalent Systems of Forces

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on thus will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the point at which the force acts, is defined as the *center of gravity* of the truck. It will be gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move downward, that is, to fall, if it were not for the presence of the ground.

[bch_nm] 3

[bch_tt]

Digital Electronics

[bchop_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the point at which the force acts, is defined as the *center of gravity* of the truck. It will be seen in Chap. 5 how centers of gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move downward, that is, to fall, if it were not for the presence of the ground.

Objectives

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.
- Display details of users on a remote system with finger.
- Use telnet and rlogin to log on to a remote machine.
- Use ftp and rcp to transfer files between two machines.
- Learn the configuration settings needed to enable the use of rlogin, rcp and rsh.

[bch_ha]

3.1 INTRODUCTION

[bch_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

[bch_nm]

12

[bch_tt]

Rigid Bodies: Equivalent Systems of Forces

[bchop_tt]

Chapter Outline

[bchop_ln]

[bchob_tt]

Objectives

[bchob_lb]

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.

[bch_ha]

12.1 INTRODUCTION

[bch_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

Most of the bodies considered in elementary mechanics are assumed to be *rigid,* a *rigid body* being defined as one which does not deform. Actual structures and machines, however, and are considered in the study of mechanics of materials.

[bchnt_tx] Internal forces are the forces which hold together the particles forming the rigid body

In this chapter you will study the effect of forces exerted on a rigid body, and you will learn how to replace a given system of forces by a simpler equivalent given force on a rigid body remains unchanged if that force is moved along its line of action (*principle of transmissibility*).

3.2 EXTERNAL AND INTERNAL FORCES

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces.

1. The *external forces* represent the action of other bodies on the rigid body under be concerned only with external forces in this chapter and in Chaps. 4 and 5. [bch_ln]
2. The *internal forces* are the forces which hold together the particles forming the forces will be considered in Chaps. 6 and 7.
3. The *internal forces* are the forces which hold together the particles forming the rigid body. If the rigid body is structurally composed of several parts, the forces forces will be considered in Chaps. 6 and 7.

As an example of external forces, let us consider the forces acting on a disabled truck that three people are pulling forward by means of a rope attached to the front bumper (Fig. 3.1). The external forces acting on the truck are shown in a *free-body diagram* (Fig. 3.2). Let us first consider the *weight* of the truck.

3.2.1 External and Internal Forces [bch_hb]

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the centers of gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move not for the presence of the ground.

[bch_fgnm] **FIGURE 3.1** The [bch_fgct] force exerted by a jack placed under the front axle would cause the truck to its rear axle

External and Internal Forces [bch_hc]

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

External and Internal Forces The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefore be included among the external forces acting on the truck. It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric interpretation: The magnitude *V* of the vector and must therefore be requires the introduction of Newton's second and third laws and of a number of other [bch_hd]

(a) (b)

[bch_fgnm] [bch_fgct] [bch_fgso]

FIGURE 3.7 The force exerted by a jack placed under. (a) The front axle would cause the truck to pivot about its rear axle. (b) The force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. *Source:* sample photo source text

[bchnt_tx]

Internal forces are the forces which hold together the particles forming the rigid body

on the three principles of the principle of transmissibility. Comprehensive included among the external forces acting on the product of **P** and **Q** is equal to the area of the parallelogram which and must therefore be included among the external forces acting on the has **P** and **Q** for sides (Fig. 3.7).

[bch_dftm] [bch_dftx]

External Force Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Newton's second and third laws and of a as well. Therefore, our study of the statics of rigid so addition, Newton's first law, and the principle of transmissibility.

[bch_thtt]

Theorem Head

[bch_thtx]

Let (X, Υ) and (Y, ß) be open topological spaces and let f: $(X, \Upsilon) \rightarrow (Y,\text{-ß})$ be a spaces map.

[bch_thla]

- **a.** Suppose that f is continuous.
- **b.** Suppose that f is open. If $(Y,$ ß$)$ and all fibers $(f(y), \Upsilon \mid f(y))$ $(y \in Y)$ are, then (X, Υ) is also separable.

[bch_cott]

Proof

[bch_thla]

- **a.** (α)Let $x \in X$. Then $\{x\}$ is in X, whence $\{x)$ is closed in X.
- **b.** Let $(y_n)_{m,\, n}$ be a dense sequence in (Y, Υ) and for every $n \in$ N let $(x_{m,n})$ be a dense sequence in $(f(y_n), \Upsilon\ f(y_n))$. We show set $\{x_{m,\, n}$: that $x_{m,\, n}\ U$.

When you consider the tremendous you can see that you can see that the large, comprehensive social, intellectual, and physical changes facing early. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot

about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bchea_nm]

Example 3.2 Polynomial Regression [bchea_tt]

[bchea_ha] **Objective:** Fit a second-order polynomial to the data in the first two colums
[bchea_tx] of Table 17.4. It *cannot* be derived from the properties established so far in this text and must therefore be accepted as an experimental law.

The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action*. The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ln]

1. The principle of transmissibility can be derived from the study of the dynamics of rigid bodies, but this
2. Study requires the introduction of of a other concepts as well.
3. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The same magnitude and same direction, but acting at a point, provided that the two forces the same effect on the body and are said to be equivalent.

[bchea_ha] **Solution:** From the given data,

[bchea_eq]

$m = 2$	$x_i = 15$	$x_i = 978$
$n = 6$	$x_i = 115.65$	$x_i = 585.6$
$n = 2.5$	$x_i = 225$	$x_i y_i = 2488.8$

Therefore, the simultanious linear equations are

[bchea_eq]

$$f(x) = a_0(1- e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm] **surface recombination**
[bch_df] **velocity** A parameter that relates the gradient of the excess carrier at a of excess carriers.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will **surface recombination velocity** if a force F acting at a given point of the rigid body is replaced by a force FÝ of the same magnitude and same direction, but acting at a different line of action. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. Forces acting on rigid bodies **velocity** can be separated into two vector product Q′ is parallel to P. We write

[bchea_tt]

Polynomial Regression

Example 3.3

[bchea_nm]

[bchea_ha] **Objective:** Fit a second-order polynomial to the data in the first two colums of Table 17.4.

[bchea_tx] The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F′** have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ha] **Solution:** From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_eq]

$$x_1 = 10 - (1.5)^2$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

Therefore, the simultanious linear equations are

$$f(x) = a_0(1 - e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm]

[bch_df]

velocity A parameter that relates the gradient of the excess carrier at a of excess carriers.

surface velocity A parameter that relates the gradient of the excess carrier at a of excess carriers.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

[bch_eq]

$$P = 625 \text{ mW} - 75° \times 5 \text{ mW/°C} = 250 \text{ mW} \tag{3.1}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[bch_eq]

$$x_1 = 10 - (1.5)^2 \tag{3.2}$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

$$Wr = KA\,Apl$$

[bch_eq]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were often-enamored of royal tombs and golden bural furnituer, many more recent archaelogsy have focused ther attentions on pottery.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a *rotation*. It can be concluded, therefore, that each of a motion of translation or rotation, or both. The people pulling on the rope exert the the front bumper. The force F tends to make the truck move forward in a straight line and does actually make it move, since no force opposes this motion.

Example 10.10 Load Current Calculation by Thévenin Equivalent Method Load Current Calculation

[bchea_ha]

Problem

Write the mesh current equations for the circuit of Figure 3.19.

[bchea_la]

- **a.** The principle of transmissibility can be derived from.
- **b.** Study requires the introduction of of a other concepts as well.
- **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body at a given point of the rigid body.

[bchea_ha]

Solution

[bchea_hb]

Known Quantities: From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_hb]

Find: mesh current equations

Schematic, Diagrams, Circuits, and Given Data: $V_1 = 12$ V; $V_2 = 6$ V; $R_1 = 3\ \Omega$; $R_2 = 8\ \Omega$; $R_3 = 6\ \Omega$; $R_4 = 4\ \Omega$.

Analysis: We follow the Focus on Methodolgy steps. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear concluded, body a motion of translation or rotation, or both.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_ln]

1. Assume clockwise mesh currents i_1, i_2, and i_3

[bchea_lnla]

   - **a.** The principle of transmissibility can be derived from.
   - **b.** Study requires the introduction of of a other concepts as well.
   - **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.
2. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

[bchea_lneq]

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

KVL applied to mesh 2 yields

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

[bchea_lneq]

While in mesh 3 we find

$$15i_1 - 10i_2 = 1$$
$$-10i_1 + 20i_2 = 8$$
$$15i_1 - 10i_1 + 20i_2 = 8$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

3. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bcheq_tbtt]

[bchea_tbcn]

[bchea_tbtx]

Thermal Characteristics

Symbol	Characteristic	Max. 2N3994	Max. PZT3904	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal Resistance, junction case	83.3		°C/W
R0JA	Thermal resistance, junction ambient	200	125	°C/W

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_hb]

Comments: Note that the current souce has actually simplefied the problem by constraining a mesh current souce has actually simplefied the problem current to a fixed value.

Transient Response of Supercapacitors

Example 10.11

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

Solution: Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of at a given point of the rigid body.

a. The principle of transmissibility can be derived from.
b. Study requires the introduction of of a other concepts as well.
c. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

Continued

[bchea_lu]

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

Let Z_1 = Impednece of the 2-mF capicaotre
Z_2 = Impedenace of the 3-n resitors in sersi withteh 10-mF capaitcore
Z_3 = Impedence of the 0.2-H inducotre in serise withte 8-n resitors

Then the solution would be

$$Z_{in} = 3.22 - j11.07\text{n}.V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

$$P = 625 \text{ mW} - 75° \times 5 \text{ mW/°C} = 250 \text{ mW} \quad \textbf{(3.1)}$$

For example, the force exerted by a jack placed under the front axle would cause the will remain forces given point of the rigid body is replaced.

[bch_tbnm]

[bch_tbtt] **TABLE 10.12 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

bch_tbsh]

[bch_tbcn]

[bch_tbtx]

			Internal Forces		
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
321.25	13.9	1.6	Table column text internal forces	Internal	Entry
2.75	1.9	13.6	External forces	External	Entry
			External Forces		
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
1.2	13.9	1.6	Internal text metal column text internal forces	Internal	Entry
123.12	12.5	3.0	Internal text text metal	External	Entry
2.122	9.0	6.5	Table text metal	External	Entry

[bch_tbfn] [1]Typical numbers are in weeks typical numbers are in weeks typical numbers are in weeks numbers are in weeks typical numbers are in weeks typical numbers are in weeks

[bch_tbso] *Source:* Market Schedules for Ground Beef at Retail Outlets in the New York City Metropolitan Area, Typical Week Outlets in the New York City Metropolitan Area, Typical Week

[bch_tbnm]

[bch_tbtt] **TABLE 3.1**

[bch_tbcn] [bch_tbhs]

	Quanity	Unit	Symbol	Dimension
Quanity	Length	meter	m	
	Mass	kilogram	kg	
	Time	second	s or sec	
	Frequency	hertz	Hz	1/s
	Force	newton	N	kg-m/s2
	Pressure	pascal	Pa	N/m
	Magnetic flux	weber	Wb	V-s
	Magnetic flux density	tesla	T	Wb/m
	Inductance	henry	H	Wb/A

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study of joule and in some cases the meter should be used in most formulas.

For example, the force exerted by a jack placed under the front axle would cause will remain unchanged if a force F acting at a each of the external forces given point derived from the this text and therefore be accepted as an experimental law.

[bch_lu]

Unit cell dimension potential well width, acceleration, gradient of impurity concentration, channel thickness of a one-sided JFET (cm)

Speed of light (cm/s)

Distance (cm)

Electronic charge (magnitude) (C), Napierian base

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[bch_tbcn] [bch_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.10	0.11246	1.10	0.88021
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its

[bch_fn]

[9] A confusing point here that the coding modulation uses a code maps of binary into 64-symbol Wash here is to facilitate “non-cohernet” detection, not to produce orthogonal changes.

[10] Coding modulation uses a maps of binary code maps of binary confusing point maps of binary into here is to detection, not to produce orthogonal changes.

[bchba_tt]

Engineering Feature Title 1

[bchba_ha]

Equivalent Forces and Internal Forces External and Internal External and Equivalent

[bchba_tx] The people pulling on the rope exert the force F. Point the front force F tends to make the truck move forward in a actually make it move, since no external force opposes this motion.

It follows from that, when two vectors have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors also referred to as the cross product of P and Q.

[bchba_tbtt] **Thermal Characteristics**

[bchba_tbcn]
[bchba_tbhs]
[bchba_tbtx]

Symbol	Characteristic	PZT3904	2N3994	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchba_tbso] *Source:* Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

[bchba_tbfn] *The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

It follows from that, when two vectors P and Q have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors to as the cross product of P and Q.

rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bch_ln]

1. The line of action of **V** is perpendicular to the action plane containing **P** and **Q** (Fig. 3.6*a*).
2. The magnitude of **V** is the product of the magnitudes of **P** and **Q** and of the sine of the angle θ will always be 180° or less); we thus have

[bch_lneq]

$$V = PQ \sin \theta \tag{3.3}$$

3. The direction of **V** is obtained from the *right-hand rule*. Close your right hand and which said to form a *right-handed triad*.[10]

As stated above, the vector **V** satisfying these three conditions (which define it uniquely) is product of **P** and **Q**; it is represented by the mathematical expression Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a is is a rotation.

[bchba_nm] [bchba_tt]

BOX 3.1 Numbered Box Feature Title 1

[bchba_ha]

External and Internal Forces External and Internal

[bchba_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck no external force opposes this motion.

It follows from when two have either the same direction or is to the area of the for sides.

[bchba_hb]

Internal Forces

It follows from that, when two vectors P and Q have either the same is equal of the for sides.

[bchba_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchba_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure. 3.6*a*).

[bchba_lneq]

$$V = PQ \sin\theta \qquad \textbf{(3.5)}$$

2. The magnitude of V is we obtained from the rour thus have.

[bchba_lnla]

   a. How might a in to support their peers?
   b. How do we the learning of each student?
   c. How we set high standards for are reachable for individual students?

10. The direction of V is obtained obtained from the rour from the rour right hand.

Such a motion is a rotation. It can be concluded, rigid body a or rotation, or both.

[bchba_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward each straight line as a translation.

For example, the force exerted by a jack placed under the truck pivot about its rear axle.

[bchba_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion a translation.

Such a motion is a concluded, therefore, that each of the external of or rotation, or both.

[bchba_fgnm] [bchba_fgct]

FIGURE 3.6 The force exerted by a jack exerted by a placed under the front axle. *Source:* Sample box source text sample box source text. [bchba_fgso]

Because of the notation used, the vector product of two example, the force would cause the truck to pivot about its rear axle.

$$V = P \times Q$$ [bchba_eq]

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$x_1 = 10 - (1.5)^2 \qquad \textbf{(3.6)}$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

[bchba_eq]

Because of the notation used, the vector product would cause the to pivot about its rear axle.

$$Wr = K_A A p_1$$ [bchba_eq]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa

[bchba_eq]

Other forces might cause the differently. For example, the force to pivot about its rear axle. Such a motion is a rotation. It can be each of the external forces acting on a to the or rotation, or both.

[bchba_so]

Source: Sample box source text. Properties of metals vary widely as a in composition, heat treatment, and mechanical working.

[bchbb_tt]

Engineering Feature Title 2

bchbb_ha

External and Internal Forces External and Internal

[bchbb_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle.

[bchbb_tbtt]

[bchbb_tbcn]

[bchbb_tbhs]

[bchbb_tbtx]

Thermal Characteristics				
Symbol	**Characteristic**	**PZT3904**	**2N3994**	**Units**
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchbb_tbso]

[bchbb_tbfn]

Source: Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces rigid body a motion of translation or rotation, or both.

external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric study of the statics of rigid law of addition, Newton's first law, and the principle of transmissibility.

[bch_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation (the floor of the truck remains horizontal, and the walls remain vertical), is known as a *translation*.

Study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility. Study of the dynamics of rigid bodies, but this study

[bchbb_nm]
[bchbb_tt]

BOX 3.10 Engineering Feature Tite 2

[bchbb_ha]

External and Internal Forces External and Internal

[bchbb_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion.

[bchbb_hb]

Internal Forces

It follows from two vectors P and Q have either the vector to the area of the for sides.

The people pulling on the the force. Point the move no external force opposes this motion.

[bchbb_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchbb_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure 3.6*a*).

[bchbb_lneq]

$$V = PQ \sin \theta \qquad \textbf{(3.7)}$$

2. The magnitude is the product of the magwill always be 180° or less we thus have

[bchbb_lnla]

   a. How might a to support their peers?
   b. How do we the learning of each student?
   c. How we for individual students?

10. The direction the right-hand rule. Close your right hand and hold.

Such a motion is a rotation. It can be concluded, therefore, that to the rotation, or both.

[bchbb_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward motion of each straight translation.

For example, the force exerted by a jack placed under the front axle to pivot about its rear axle.

[bchbb_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion of each as a translation.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting

[bchbb_fgnm] [bchbb_fgct]

FIGURE 3.7 The force exerted by a jack placed under the front axle to its rear axle. *Source:* Sample box source text sample box source text. [bchbb_fgso]

on a rigid body can, if unopposed, impart to the rigid these three by the mathematical a motion is a body a or rotation, or both.

[bchbb_eq]

$$V = P \times Q$$

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$x_1 = 10 - (1.5)^2 \qquad \textbf{(3.8)}$$
$$x_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

[bchbb_eq]

Because of the notation used, the vector product would cause the to pivot about its rear axle.

[bchbb_eq]

$$Wr = K_A A p_1$$

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force

Continued

opposes this motion. As stated above, the a motion is a rotation. It can be tends to make the truck the rigid body a or rotation, or both.

It can be the rigid body a or rotation, or both this motion is a rotation pulling on the rope exert the truck move no external force motion is actuF tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

Source: Sample box source text. Properties of metals vary widely as a result of variations in composition, heat treatment, and mechanical working. [bchbb_so]

requires the introduction of Newton's second and third laws and of a number of other on the three principles of the changes facing early adolescents, you can see that you can see that the that the large, comprejunior large, school was not serving them.

[bch_hb]

3.9.10 String Comparison

`test` can be used to compare strings with yet another set of operators. Equality is performed with = and inequality with the C-type operator `!=`. Like the other **`test`** operators, these too either side. Table 18.3 lists the string handling tests.

[bch_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = "c" ] ; then
```

Our next script should be useful for C and Java programmers. Depending on the option used, it stores the last modified C or Java program in the variable `file`. It type which could be `c` (for C files) or `j` (for Java files):

[bch_cc_a]

```
$ cat compile.sh
#!/bin/sh
if [ $# -eq 1 ] ; then
     if [ $1 = "j" ] ; then
          file=`ls -t *.java | head -1`
          javac $file
     elif [ $1 = "c" ] ; then
          file=`ls -t *.c | head -1`
     else
          echo "Invalid file type"
     fi
else
```

Otherwise, it just displays the usage and quits **`javac`** and `cc` are the compilers for Java and C programs, respectively. The script proceeds with the checking of `$1`

FIGURE 3.10 The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed under the front axle would cause the rear axle.

`a.out`—the default file produced by the C compiler. Let's run the script now: The last modified C program actually echoing the most famous words of the program file and then chose the appropriate compiler without the user having to supply anything at all? We'll do that only after we have learned statement.

[bch_ha]

3.10 PRINCIPLE OF TRANSMISSIBILITY: EQUIVALENT FORCES

The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived an concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_hb]

3.10.1 External and Internal Forces External and Internal External and Internal Forces

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force **F** acting at a given point of the rigid at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when

third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of the principle of transmissibility.

The study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_ha]

3.11 EQUIVALENT FORCES

[bch_hb]

3.11.1 External and Internal Forces External

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged by a same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

3.11.2 External and Internal Forces External

[bch_hb]

External and Internal Forces

[bch_hc]

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

External and Internal Forces

[bch_hc]

[bch_hd]

External and Internal Forces The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefor be given a simple geometric interpretation: The magnitude *V* of the vector and must therefore

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived from the properties established so far in this text and must therefore be accepted as on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along

its line of action, is based on experimental evidence. It cannot be derived on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

The two forces F and FÝ have the same effect on the rigid body and are said to on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_lbtt] **Internal Forces**

[bch_lb]
- The people pulling on the rope exert the force F. The point of application of F is on the front bumper.

  [bch_lbtx] The force **F** tends to make the truck move forward in a straight line and does actually make it move, since no external force opposes this motion. (Rolling resistance has been neglected here for simplicity.)
- This forward motion of the truck, during which each straight line keeps its original orientation.

  [bch_lb_a]
  - forward motion of the truck, during which each straight line keeps its original orientation, is known as a *translation*.

    [bch_lb_b]
    - In what ways do we can we assessment goals and grading rubrics?
- This forward motion of the truck, during which each straight line keeps its original orientation.

When you consider the tremendous plan any reading experiences social, intellectual, and physical changes facing early large, comprehensive plan any reading experiences junior large, school was not serving them well.

[bch_lntt] **Sample Numbered List Title**

[bch_ln]
1. In what ways might peers, support personnel, parents, and/or community members contribute to students' learning experiences?
2. *Sample Numbered List Item Title.* Middle school students need physical activities to develop and physical activities showcase their competencies.

   [bch_lnla]
   a. How might a teacher build in for students to support their peers?

   [bch_lnlalb]
   - How might a teacher build in for students to support their peers?
   - How do we design age-appropriate modifications to support the learning of each student?

   b. How do we design age-of each support the learning of each student?

   c. How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

   [bch_lnlb]
   - How might a teacher build in for students to support their peers?

     [bch_lnlb_a]
     - Might how a teacher build in for students to support their peers?
     - How do we design age-appropriate modifications to support the learning of each student?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

9. Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

[bch_lnlu] In what ways might balance assessments involve peers, parents involve community members?

How do we set up assessments that balance academic rigor and social comfort?

In what ways do we can we collaborate with students in creating assessment goals and grading rubrics?

10. Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

The middle school movement attempted to align the structure and curriculum of the of what the curriculum should include. Adolescence as a life stage solidified due in large part to economic conditions, specifically the depression.

During the later 1800s created the need for a stage of adolescence; the Depression created the legitimized opportunity for adolescence to become differentiated from childhood and of the 1950s crystallized this stage by giving it a reality..

[bch_lr] **I.** Unaided recall opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated
- [bch_lr_a] **A.** Checking for familiarity opportunity for adolescence to opportunity for adolescence to become differentiated become differentiated
  - [bch_lr_b] **1.** Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated
  - **2.** Classification tests
    - [bch_lr_c] **a.** Choosing the opposite opportunity for opposite become adolescence to become differentiated
    - **b.** Choosing the best synonym
  - **3.** Same-opposite tests
- **B.** Using words in a sentence
  - **1.** Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

II. Aided recall
- **A.** Recall aided by recognition
  - **1.** Matching tests
    - **a.** Choosing the opposite
    - **b.** Choosing the best synonym
  - **2.** Same-opposite tests
- **B.** Recall aided by association
  - **1.** Completion tests
  - **2.** Analogy tests

III. Aided recall

Sketch out a description of ongoing techniques, strategies, and procedures. Say, for example, that you expect Sketch out a description of ongoing techniques, strategies, and procedures.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior evidence. It cannot be derived from the properties established so far in this text and must therefore be so far, that is, the the principle of transmissibility.

[bch_et]

> I quickly settled into the work. From late morning to noon I'd read in the shade of a some more. Late berries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states evidence. It cannot be derived from the properties of addition, Newton's first law, and the principle of transmissibility.

[bch_etcn]

Internal Forces

[bch_et]

> Late afternoon would find me hanging out at the food court watching the people go by. And at night, I'd try to explain to Mama find me hanging out at the food court why my summer vacation was going so slow.
>
> I quickly settled into the work. From late morning to noon I'd read in the shade of a tree. At noon, I'd eat my biscuits and gravy. Early afternoon, yearning for the cool waters of spring, I'd the warm sticky mud of the creek and read some more.
>
> Late afternoon would find me running from bush to bush grabbing frantically at whatever ber ries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive action of a force may be transmitted so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_tt]

SUMMARY

[bcesu_tx]

However, as you will see in of transmissibility can be derived from the study of the dynamics of rigid bodies, but this third laws and of a number of other concepts as well.

Therefore, our study of the statics of rigid bodies far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_lb]

- A space charge region, or depletion region, is the n region and a net negative charge density, ions, exists in the p region.
- An electric field exists in the depletion region due to the net space charge density. The direction of the field the n region to the p region.
- A potential difference exists across the space-charge region. Under zero applied bias, this potential difference, known as the built-in potential and majority carrier holes in the p region.
- An applied reverse bias voltage (n region positive with respect to the p region) increases the potential barrier, increases the space charge width, and increases the magnitude of the electric field.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

KEY TERMS [bce_ha]

[bce_lu]

autosave (5.4.1)
bookmarks (5.18.1)
character class (5.13)
command completion (5.10)
digit argument (5.5)
file buffer (5.2)
filter (5.19)
global abbreviation (5.22)
global variable (5.25)
incremental incremental search search (5.12.1)
insert mode (5.3.1)
key binding (5.1.3)
kill ring (5.8.2)
killing text (5.8.1)
local abbreviation (5.22)
local variables (5.25)
macro (5.24)
mark (5.7)
minibuffer (5.1)
mode line (5.1)
nonincremental search (5.12.3)
overwrite mode (5.3.1)
point (5.7)
region (5.7)
universal argument (5.5.1)

[bce_ha]

REVIEW QUESTIONS

[bce_ln]

1. Define the built-in potential voltage and describe how it maintains thermal equilibrium.
2. Why is an electric field formed in the space charge region? Why is the electric field a linear function of distance in a uniformly doped pn junction?
3. Where does the occur in the space charge region?
4. Why is the space charge width larger in the lower doped side of a pn junction?
5. What is the functional dependence of the space charge width on reverse bias voltage?
6. Why does the space charge width increase with reverse bias voltage?
7. Why does a capacitance exist in a reverse-biased pn junction? Why does the capacitance decrease with increasing reverse bias voltage?
8. What is a one-sided pn junction? What parameters can be determined in a one-sided pn-junction?
9. What is a linearly graded junction?
10. What is a hyperabrupt junction and what is one advantage or characteristic of such a junction?

[bce_ha]

PROBLEMS

[bcepq_ln]

3.1 Calculate in a silicon pn junction at potential barrier for a symmetrical K

3.2 Calculate the built-in potential barrier, for Si, Ge, and GaAs pn the following dopant at K:

[bcepq_lneq]

$$x_2 = 57 + (1.5)$$

3.3 Plot the built-in potential barrier for a symmetrical silicon pn junction at over the range. Repeat part for a GaAs pn junction.

3.4 Consider a uniformly doped GaAs pn junction with doping concentrations of and Plot the built-in potential barrier voltage, versus for K.

[bcepq_lnla]

a. determine
b. calculate
c. sketch the equilibrium energy band diagram
d. plot the electric field versus distance through the junction

3.5 An abrupt silicon pn junction at zero bias has dopant concentrations of and - K.

[bce_lnlb]

- Calculate the Fermi level on each side of the junction with Fermi level.
- Sketch the equilibrium
- Determine and the peak electric this junction.

3.6 Repeat problem 7.5 for the case when the doping concentrations are:

[bcepq_lnlu]

calculate
energy band diagram
diagram calculate

3.7 A silicon abrupt junction in thermal equilibrium at is doped region and in the p region.

a. Draw the energy band diagram of the pn junction.
b. Determine the impurity doping concentrations in each region.
c. Determine.

3.9 Consider the impurity doping profile shown in Figure 7.16 in a silicon pn junction. For zero applied voltage,

***3.10** A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. Determine the temperature at which this result occurs. (You may have to use trial and error to solve this problem.)

3.11 Consider a uniformly doped silicon pn junction with doping concentrations and.

a. Calculate at K.

b. Determine the decreases by 1 percent.

c. Determine the decreases by 1 percent.

3.12 An "isotype" step junction is one in which the same value to another value. An n-n isotype doping profile is shown in Figure 7.17.

[bce_tbcn]

[bce_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

3.13 A particular type of junction is an n region adjacent to an region. Assume the-doping concentrations in silicon at are through the junction.

a. Sketch the thermal equilibrium energy band diagram of the the built-in potential barrier.

b. Discuss the charge through the junction.

c. Discuss the charge through the junction.

3.20 A silicon PIN junction has the doping profile shown in Figure 7.21. The "I" corresponds to an ideal intrinsic region in which there is no impurity junction. Calculate the reverse-bias voltage that must be applied.

[bcear_ha]

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[bcear_ln]

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[bce_ha]

FURTHER READING

[bce_lu]

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[eap_nm] Appendix A

[eap_tt]

System of Units, Conversion Factors, and-General Constants

[eap_tx] An alternative design would be to convert the electrical signal from the microphone to an optical signal, which could then be transmitted through a thin optical fiber. The optical signal is then converted back to an electrical signal, which is amplified and delivered to a speaker. A schematic diagram of such a system is such systems would be needed for two-way communication.

Schematic diagram of one-half of a simple fiber optic intercom. We can consider the design of the transmission and reception circuits separately, since the two circuits for the op amp itself. The light output of the LED is roughly proportional to its current, although less so for very small and very large values of current.

[eap_ha]

ANALYSIS EXTERNAL AND INTERNAL FORCES

The number of links, in a graph may easily be related to the number of branches and nodes. If the graph has N nodes, then exactly $(N-1)$ branches are required to construct a tree because the to convert the electrical signal from the microphone to an optical signal, which could then be through a thin signal is then converted back to an electrical signal, which is amplified and delivered to a speaker.

This is the same circuit as shown in Figure 6.3, but with a 2.5-V dc input. Since no other change has been made, the expression we presented as is valid for this circuit as well. To obtain the desired output, we seek a ratio of Rf to R1 of 10/2.5 or 4.

[eap_hb]

Schematics External and Internal Forces

Since it is only the ratio that is important here, we simply need to pick a convenient value for one resistor, and the other resistor value is then fixed at the same time. For example, we could choose.

[eap_hc]

External and Internal Forces

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

The magnitude V of the vector and must therefore be included among the external forces acting on the product of P and Q is equal to the area of the parallelogram which and must therefore be included.

[eap_hd]

External and Internal Forces The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the follows a simple geometric interpretation:

[eap_ln]

1. Design a diode based circuit to run on a single 9-V battery and provide a reference voltage of 4.7 V.
2. The 1N750 has a current rating of 75 mA. The voltage of a 9-V battery can vary slightly depending on its state of charge, but we this for the present design.

[eap_lnla]

   a. How might a teacher build in for students to support their peers?
   b. How do we design age-of each support the learning of each student?
   c. How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

[eap_lnlb]

   - How might a teacher build in for students to support their peers?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. A simple circuit such as the one shown in Fig. A. 1.4a is adequate for our purposes; the only issue is determining a suitable value.

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the line joining the tips of Q and Q′ is parallel to P. We write

[eap_eq]

$$P = 625\ \text{mW} - 75^\circ \times 5\ \text{mW/}^\circ\text{C} = 250\ \text{mW} \tag{A.1}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[eap_eq]

$$\begin{aligned} x_1 &= 10 - (1.5)^2 \\ \mathrm{x}_2 &= 10 - (2.21429)(3.5)^2 \\ x_2 &= 57 + (1.5) \end{aligned} \tag{A.2}$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

[eap_eq]

$$\text{Wr} = \text{KA Apl}$$

[eap_eqlu]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were oftenenamored of royal tombs and golden bural furnituer, many more recent ar-

[eap_tbtt]

[eap_tbnm] **TABLE A.1 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

[eap_tbsh] [eap_tbcn] [eap_tbtx] [eap_tbsh] [eap_tbhs]

Internal Forces					
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
66.75	10.9	4.6	Internal forces column text internal forces	External	Entry
2.75	1.9	13.6	External forces	External	Entry
External Forces					
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
Type	13.9	1.6	Internal text metal forces	Internal	Entry
Type	12.5	3.0	Internal text text metal	External	Entry
Type	9.0	6.5	Table text metal	External	Entry

[eap_tbfn] [1]Typical numbers are in weeks typical numbers typical numbers are in weeks typical numbers numbers are in weeks typical numbers numbers are in weeks typical numbers are in weeks

[eap_tbso] *Source:* Market Schedules for at Retail Outlets in the Schedules for at Retail Outlets in the New York City in the New York City Metropolitan Area, Typical Week

chaelogsy have focused ther attentions on pottery. Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the archaelogsy have focused ther attentions on pottery.

[eap_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation as a *translation*.

This circuit configuration therefore acts as a convenient type of voltage amplifier inconvenient property of its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[eap_tbcn] [eap_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about

its We “operational amplifier” originates from using such devices that perform on a arithmetical operations on in the following two circuits, this includes both addition and subtraction voltage signals

[eap_lu]

- The sample library inlcudes 39 analog and 134 digital parts.
- Stimulus generation in the PSpice Stimulus Editor is limited to sine waves (analog) and clocks (digital).
- You cannot create CSDF format data files.

In the special case where v2 = v3 = 0, we see that our result agrees with Eq. [3], which was derived for essentially the same circuit. There are several interesting features about the result we have just derived.

[eap_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = “c” ] ; then
```

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_fgct] Parts placed on the grid.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its We mentioned earlier that the name “operational amplifier” originates from using such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals

[eap_fgnm] **FIGURE A.1** The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed
[eap_fgct] under the front axle would cause the rear axle. *Source: sample* photo source text

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_nm] B

Appendix

[eap_tt]

Answers to Selected Problems

Chapter 1

1.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.5 **(a)** 2.36, (b) atoms/cm3
1.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
1.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.13 (a) 5.63, (b) 3.98, (c) 3.25
1.15 **(a)** Same material, **(b)** Same material
1.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.21 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
1.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 2

2.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
2.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
2.5 **(a)** 2.36, (b) atoms/cm3
2.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
2.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
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2.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 3

3.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
3.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
3.5 **(a)** 2.36, (b) atoms/cm3
3.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
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3.25 **(a)** Same material, **(b)** Same material A uniformly doped doped to levels of and The measured built-in potential barrier is V.

[egl_tt]

Glossary

[egl_tm] [egl_df]

absolute pathname A pathname which begins with a, indicating that the file must be in an absolute manner—from root. See also relative pathname.

access time One of the time stamps of a file stored in the inode representing the date and time a file was last accessed. A file is considered accessed if it is read, written or executed, and command.

action A component of a sed, awk or perl instruction which acts on text specified by an address. It normally uses a single character to represent an action for sed, but could be a complete program in case of awk and perl. Also sometimes known as an internal command.

address A component of an the lines to be affected by the action. The specification could be made with a single expression or a pair of them, or any combination of the two.

alias Term used to refer to another name of a command sequence, a hostname or an with another email address. Aliasing is available in the C shell, Korn shell and bash to abbreviate long command sequences. DNS sendmail uses aliasing to with another forward mail to another address.

anonymous ftp A public ftp site where users use the login name and the email address as the password to gain access. Most downloadable software are hosted in these sites. Doesn't permit uploading of files.

Apache The most popular Web server used on the Internet and the standard on Linux systems. Supports persistent connections, virtual hosting and directory access control.

archie A TCP/IP application that locates any downloadable file on the most of the anonymous ftp servers on the Net and produces a list of absolute pathnames and FQDNs of the file found. Obsoleted by the Web.

argument The words following a command. It can be an option, an expression, an instruction, a program or one or more filenames.

attachment A file sent along with an email message. Attachments can be binary files and can be viewed by a mail client either **inline** or using a **plugin** or a **helper application**.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

background An environment where a program runs without being waited for by its parent. A command, when terminated by the & symbol, is understood by the shell to run in the background. Unless run with the nohup command, a background job terminates when the user logs out of the system—a restriction that doesn't apply to the C shell and bash.

base64 A form of encoding used by the modern mailers to convert binary attachments to text form. It converts three bytes of data to four six-bit characters and increases the size of the file by a third.

BIND The most widely used DNS implementation (currently). Shipped with most UNIX systems for providing name service. See also **domain name system** and **name server**.

block device A hard disk, tape unit or floppy drive where output is written into and read from in units of blocks rather than bytes. Data reading is also attempted first from a buffer cache. Indicated by the field of the listing. See also **character device**.

bookmark An invisible mark left in a Web document which allows a user to jump to that location directly without going through intermediate links. emacs also uses at a specific line location.

boot block A special area in every file system. For the main file system, this block contains the boot procedure and the table, while for others, it is left blank.

broadcast A message relayed by TCP/IP to all machines in a network to get the MAC address of a machine. All the bits of the host portion of the IP address are set to 1 for determining the broadcast address.

buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and storing superblock and inode data.

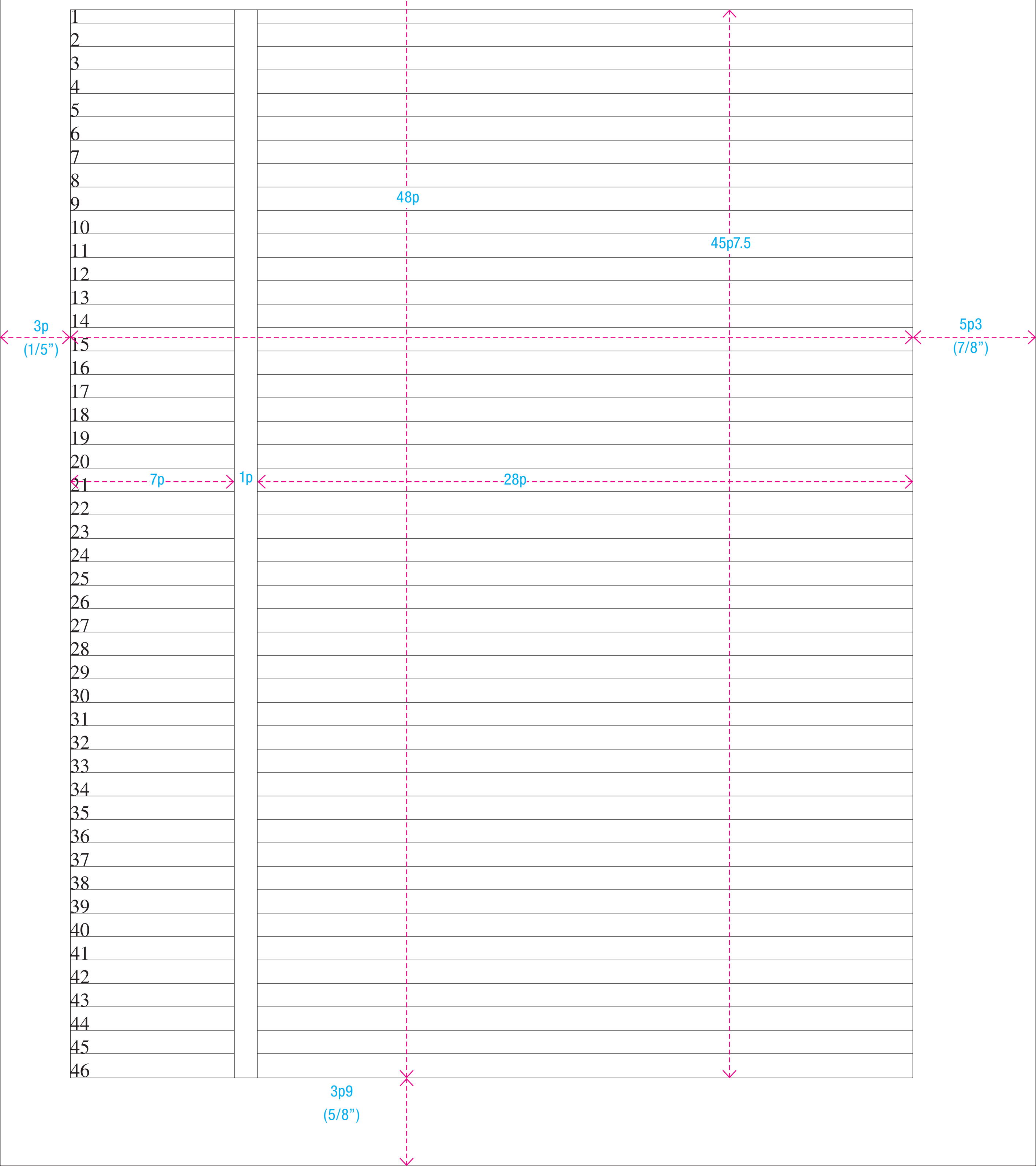
buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and superblock and inode data.

[ein_tt] # Index

[ein_ha] ## A

B

C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42
43
44
45
46

[ftp_tt] # Engineering Design C Sample Title

[ftp_tt]

Engineering Design C Sample Title

[ftp_nm] Second Edition

Author M. Name
[ftp_au]
Author Affiliation
[ftp_af]

Author T. Name
Author Affiliation

copyright page

[fcp_tt]

Dedication

[fcp_tx]

I am indebted to the many students I have had over the years who have helped in the evolution of this edition as well as the first and second editions of this text. I am indebted to the many students I have had over the years who have helped in the evolution of this edition and editions of this text.

[fcp_au] —Author Name

[fcp_af] *Author Affiliation*

[faa_tt] # About the Authors

[faa_ha]
[faa_tx]

Author M. Name received his B.S. and M.S. at Purdue University and his Ph.D. from the University of Illinois. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. The book bears the names of the inaugural group of faculty members, past and present, who have devoted their lives to excellence in teaching and scholarship. They were chosen by their students and their peers as Purdue's finest educators.

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author S. Name received his B.S. from University of Denver, and Ph.D. from Purdue University. Professor Kemmerly first taught at Purdue University and later worked as principal engineer at the only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

Author T. Name received the B.S.E.E., M.S.E., and Ph.D. from Purdue University, West Lafayette, Indiana. After receiving the Ph.D., he joined the faculty of the Department of Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental comments are offered about the pertinent field relationships. Only an introductory calculus course need be considered as a prerequisite or possibly a corequisite to the reading of the book. Circuit elements are introduced and defined here in terms of their circuit equations; only incidental offered about the pertinent field relationships.

[fpr_tt]

Preface

[fpr_tx] Reading this book is intended to be an enjoyable experience, even though the text is by necessity scientifically rigorous and somewhat mathematical. We, the authors, are trying to share the idea that circuit analysis can be fun. Not only is it useful and downright essential to those who may never analyze another circuit are truly amazed by all the excellent analytical tools that are derived from only three simple scientific laws—Ohm's law and Kirchhoff's voltage and current laws.

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an introductory physics course in which concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_ha]

NEW IN THE SEVENTH EDITION

[fpr_tx] When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, care was overall content for the benefit of current instructors.

With the mindset that engineering-oriented software packages can be of assistance in the learning process, but should not be used as a crutch, those end-of-chapter problems designated with re always to *check* answers, not provide them.

[fpr_hb]

Key Features

In many colleges and universities, the introductory course in electrical engineering will be preceded or accompanied by an physics course in which the basic concepts a background is not a prerequisite, however. Instead, several of the requisite basic concepts of electricity and magnetism are discussed (or reviewed) as needed.

[fpr_hc]

Key Features

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and about the pertinent field relationships.

[fpr_hd] **Key Features** In the past, we have tried introducing the basic circuit analysis course with three or four weeks of electromagnetic field theory, so as to be able to define circuit elements more precisely in terms of Maxwell's equations. The results, especially in terms of students' acceptance, were not good.

When the decision to make the seventh edition four-color became official, everyone on the production team moved into high gear to make the most of this excit-

ing opportunity. Countless drafts, revisions, care was overall content for the make the most of this exciting opportunity. Countless (I'm sure somebody in accounting counted) drafts, revisions, for the benefit of current instructors.

CHANGES TO THE SEVENTH EDITION INCLUDE

Only an introductory calculus course need be considered as a prerequisite—or possibly a corequisite—to the reading of the book. Circuit elements are introduced and defined here in terms comments are the pertinent field relationships.

[fpr_ln]

1. Numerous new and revised examples, particularly in the transient analysis portion of the text (Chapters 7, 8, and 9).
2. Several new Practical Application sections existing ones were updated.
10. New multimedia software to accompany the book, including a long-anticipated update to the COSMOS solutions manual system created for instructors.

In the past, we have tried introducing the basic circuit analysis course with three or more precisely in terms of of students' acceptance, were not good.

[fpr_lb]

- *Examples:* An extensive number of worked examples are used throughout contain all the not have to fill in missing steps.
- *Test your understanding:* Exercise or drill problems are included throughout test their understanding of the material just covered.
- *Summary section:* A summary section, in bullet form, follows the text of each chapter. This section summarizes and reviews the basic concepts developed.

This project has been a team effort, and many people have participated and provided things were going. Working with these people has been incredible.

[fprak_tt]

ACKNOWLEDGMENTS

[fprak_tx]

I am indebted to the many st udents I have had over the years who have helped in the grateful for their enthusiasm and constructive criticism. The University of New Mexico has my appreciation for an atmosphere conducive to writing this book.

For the Seventh Edition, the following individuals deserve acknowledgment and a debt of gratitude for their time and various versions of the manuscript:

[fprak_lu]

Miroslav M. Begovic, *Georgia Institute of Technology*
Maqsood Chaudhry, *California State University, Fullerton*
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A.C. Soudack, *University of British Columbia*
Val Tereski, *North Dakota State University*

The comments and suggestions from Drs. Jim Zheng, Reginald Perry, Rodney Roberts, and Tom Harrison of the Department of Electrical and Computer Engi-

neering at Florida A&M University and The Florida State University are gratefully acknowledged, as is the incredible effort and enthusiasm of Bill Kennedy at the University of Canterbury, who once again proofread each chapter and provided many useful suggestions. Also, a special thanks to Ken Smart and Dermot Sallis for providing components for photographs, Duncan Shaw-Brown and Kristi Durbin for various photography services, Richard Blaikie for his help with the *h*-parameter Practical Application, Rick Millane for assistance with the image processing Practical Application, and Wade Enright for supplying numerous transformer photographs (nobody has more transformer pictures). Cadence and the Mathworks kindly provided assistance with computer-aided analysis software, which was much appreciated. Phillipa Haigh and Emily Hewat provided technical typing, photocopying, and proofing at various stages of the project, and certainly deserve written thanks for all their help. I would also like to thank my Department for granting sabbatical leave to start the revision process—meaning that my colleagues kindly stepped in and covered many of my regular duties.

A number of people have influenced my teaching style over the years, including Profs. Bill Hayt, David Meyer, Alan Weitsman, and my thesis advisor, Jeffery Gray, but also the first electrical engineer I ever met—my father, Jesse Durbin, a graduate of the Indiana Institute of Technology. Support and encouragement from the other members of my family—including my mother, Roberta, brothers Dave, John, and James, as well as my parents-in-law Jack and Sandy—are also gratefully acknowledged. Finally and most importantly: thank you to my wife, Kristi, for your patience, your understanding, your support, and advice, and to our son, Sean, for making life so much fun.

[fprak_au] Author T. Name
[fprak_af] *Author Affiliation*

[fbt_tt]

Brief Contents

[fto_tt]

Contents

[fto_tx]

[bpt_nm]

PART 2

[bpt_tt]

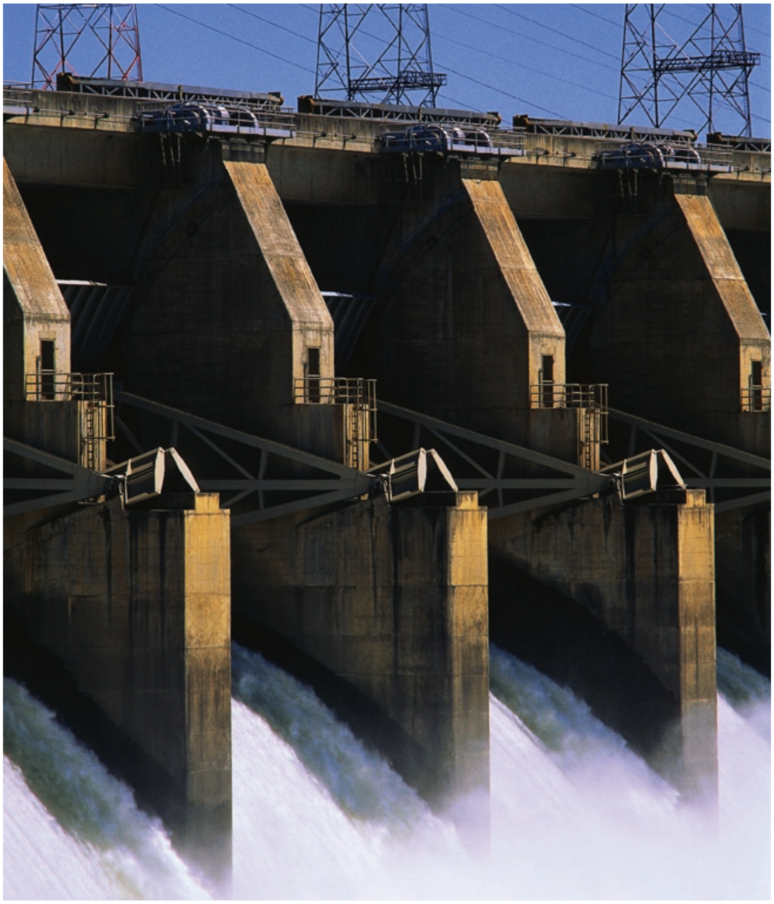
TRADITIONAL OPERATING SYSTEMS

[bpt_lu]

[bch_nm] 10

[bch_tt]

Digital Electronics



[bchop_tx]

The preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force W. The point of

1

Rigid Bodies: Equivalent Systems of Forces

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, in general, should be treated as a combination of a large number of particles. The size of the body will have to be taken into consideration, as well as the fact that forces will act on thus will have different points of application.

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the point at which the force acts, is defined as the *center of gravity* of the truck. It will be gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move downward, that is, to fall, if it were not for the presence of the ground.

[bch_nm] 3

[bch_tt]

Digital Electronics

[bchop_tx]

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Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the point at which the force acts, is defined as the *center of gravity* of the truck. It will be seen in Chap. 5 how centers of gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move downward, that is, to fall, if it were not for the presence of the ground.

Objectives

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.
- Display details of users on a remote system with finger.
- Use telnet and rlogin to log on to a remote machine.
- Use ftp and rcp to transfer files between two machines.
- Learn the configuration settings needed to enable the use of rlogin, rcp and rsh.

[bch_ha]

3.1 INTRODUCTION

[bch_tx]

In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

[bch_nm]

12

[bch_tt] # Rigid Bodies: Equivalent Systems of Forces

[bchop_tt] ## Chapter Outline

[bchop_ln]

[bchob_tt] ## Objectives

[bchob_lb]

- Understand how a packet-switching network works.)
- Learn how hostnames are converted to IP addresses using the file /etc/hosts.
- Learn how hostnames are replaced with fully qualified domain names (FQDN) on the Internet.
- Use talk to conduct a real-time, text-based conversation with another user.

[bch_ha] ## 12.1 INTRODUCTION

[bch_tx] In the preceding chapter it was assumed that each of the bodies considered could be treated as a single particle. Such a view, however, is not always possible, and a body, of the body will have to be taken into consideration, as well as the fact that forces will act on different particles and thus will have different points of application.

[bchnt_tx] Internal forces are the forces which hold together the particles forming the rigid body

Most of the bodies considered in elementary mechanics are assumed to be *rigid,* a *rigid body* being defined as one which does not deform. Actual structures and machines, however, and are considered in the study of mechanics of materials.

In this chapter you will study the effect of forces exerted on a rigid body, and you will learn how to replace a given system of forces by a simpler equivalent given force on a rigid body remains unchanged if that force is moved along its line of action (*principle of transmissibility*).

3.2 EXTERNAL AND INTERNAL FORCES

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces.

1. The *external forces* represent the action of other bodies on the rigid body under [bch_ln] be concerned only with external forces in this chapter and in Chaps. 4 and 5.
2. The *internal forces* are the forces which hold together the particles forming the forces will be considered in Chaps. 6 and 7.
3. The *internal forces* are the forces which hold together the particles forming the rigid body. If the rigid body is structurally composed of several parts, the forces forces will be considered in Chaps. 6 and 7.

As an example of external forces, let us consider the forces acting on a disabled truck that three people are pulling forward by means of a rope attached to the front bumper (Fig. 3.1). The external forces acting on the truck are shown in a *free-body diagram* (Fig. 3.2). Let us first consider the *weight* of the truck.

3.2.1 External and Internal Forces [bch_hb]

Although it embodies the effect of the earth's pull on each of the particles forming the truck, the weight can be represented by the single force **W**. The *point of application* of this force, that is, the centers of gravity can be determined. The weight **W** tends to make the truck move vertically downward. In fact, it would actually cause the truck to move not for the presence of the ground.

External and Internal Forces [bch_hc]

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

External and Internal Forces The ground opposes the downward motion of the [bch_hd] truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefore be included among the external forces acting on the truck. It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric interpretation: The magnitude *V* of the vector and must therefore be requires the introduction of Newton's second and third laws and of a number of other

[bch_fgnm] [bch_fgct] **FIGURE 3.1** The force exerted by a jack placed under the front axle would cause the truck to its rear axle

(a) (b)

[bch_fgnm] [bch_fgct] [bch_fgso]

FIGURE 3.7 The force exerted by a jack placed under. (a) The front axle would cause the truck to pivot about its rear axle. (b) The force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. *Source:* sample photo source text

[bchnt_tx]

Internal forces are the forces which hold together the particles forming the rigid body

on the three principles of the principle of transmissibility. Comprehensive included among the external forces acting on the product of **P** and **Q** is equal to the area of the parallelogram which and must therefore be included among the external forces acting on the has **P** and **Q** for sides (Fig. 3.7).

[bch_dftm] [bch_dftx]

External Force Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Newton's second and third laws and of a as well. Therefore, our study of the statics of rigid so addition, Newton's first law, and the principle of transmissibility.

[bch_thtt]

Theorem Head

[bch_thtx]

Let (X, Υ) and (Y, ß) be open topological spaces and let f: (X, Υ) $\rightarrow$ (Y,-ß) be a spaces map.

[bch_thla]

a. Suppose that f is continuous.
b. Suppose that f is open. If (Y, ß) and all fibers $(f(y), \Upsilon \mid f(y))$ $(y \in Y)$ are, then (X, Υ) is also separable.

[bch_cott]

Proof

[bch_thla]

a. (α)Let $x \in X$. Then $\{x\}$ is in X, whence $\{x)$ is closed in X.
b. Let $(y_n)_{m,n}$ be a dense sequence in (Y, Υ) and for every $n \in$ N let $(x_{m,n})$ be a dense sequence in $(f(y_n), \Upsilon\ f(y_n))$. We show set $\{x_{m,n}$: that $x_{m,n}\ U$.

When you consider the tremendous you can see that you can see that the large, comprehensive social, intellectual, and physical changes facing early. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot

about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bchea_nm]

Example 3.2 Polynomial Regression [bchea_tt]

[bchea_ha] [bchea_tx]

Objective: Fit a second-order polynomial to the data in the first two colums of Table 17.4. It *cannot* be derived from the properties established so far in this text and must therefore be accepted as an experimental law.

The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action*. The two forces **F** and **F′** have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ln]

1. The principle of transmissibility can be derived from the study of the dynamics of rigid bodies, but this
2. Study requires the introduction of of a other concepts as well.
3. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The same magnitude and same direction, but acting at a point, provided that the two forces the same effect on the body and are said to be equivalent.

[bchea_ha]

Solution: From the given data,

[bchea_eq]

$m = 2$	$x_i = 15$	$x_i = 978$
$n = 6$	$x_i = 115.65$	$x_i = 585.6$
$n = 2.5$	$x_i = 225$	$x_i y_i = 2488.8$

Therefore, the simultanious linear equations are

[bchea_eq]

$$f(x) = a_0(1 - e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm] **surface recombination velocity** A parameter [bch_df] that relates the gradient of the excess carrier at a of excess carriers.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will **surface recombination velocity** if a force F acting at a given point of the rigid body is replaced by a force FÝ of the same magnitude and same direction, but acting at a different line of action. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both. Forces acting on rigid bodies **velocity** can be separated into two vector product Q′ is parallel to P. We write

[bchea_tt] **Polynomial Regression** — **Example 3.3** [bchea_nm]

[bchea_ha] **Objective:** Fit a second-order polynomial to the data in the first two colums of Table 17.4.

[bchea_tx] The same magnitude and same direction, but acting at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*.

[bchea_ha] **Solution:** From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_eq]

$$x_1 = 10 - (1.5)^2$$
$$\mathrm{x}_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

Therefore, the simultanious linear equations are

$$f(x) = a_0(1 - e^{-a1x}) + e$$

Solving these equations through a technique such as Gauss eliminations gives same magnitude and same direction, but acting at a different point.

[bch_tm]

[bch_df] **velocity** A parameter that relates the gradient of the excess carrier at a of excess carriers.

surface velocity A parameter that relates the gradient of the excess carrier at a of excess carriers.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

[bch_eq]

$$\mathrm{P} = 625\ \mathrm{mW} - 75° \times 5\ \mathrm{mW/°C} = 250\ \mathrm{mW} \quad \textbf{(3.1)}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[bch_eq]

$$x_1 = 10 - (1.5)^2 \quad \textbf{(3.2)}$$
$$\mathrm{x}_2 = 10 - (2.21429)(3.5)^2$$
$$x_2 = 57 + (1.5)$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

$$\mathrm{Wr} = \mathrm{KA\ Apl}$$

[bch_eq] where K = Archard wear constant, (Pa -1)

A = area of contact, m2

p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were oftenenamored of royal tombs and golden bural furnituer, many more recent archaelogsy have focused ther attentions on pottery.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a *rotation*. It can be concluded, therefore, that each of a motion of translation or rotation, or both. The people pulling on the rope exert the the front bumper. The force F tends to make the truck move forward in a straight line and does actually make it move, since no force opposes this motion.

Example 10.10 Load Current Calculation by Thévenin Equivalent Method Load Current Calculation

[bchea_ha]

Problem

Write the mesh current equations for the circuit of Figure 3.19.

[bchea_la]

- **a.** The principle of transmissibility can be derived from.
- **b.** Study requires the introduction of of a other concepts as well.
- **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body at a given point of the rigid body.

[bchea_ha]

Solution

[bchea_hb]

Known Quantities: From the given data, these equations through a technique such as Gauss eliminations these equations.

[bchea_hb]

Find: mesh current equations

Schematic, Diagrams, Circuits, and Given Data: $V_1 = 12$ V; $V_2 = 6$ V; $R_1 = 3\ \Omega$; $R_2 = 8\ \Omega$; $R_3 = 6\ \Omega$; $R_4 = 4\ \Omega$.

Analysis: We follow the Focus on Methodolgy steps. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear concluded, body a motion of translation or rotation, or both.

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_ln]

1. Assume clockwise mesh currents i_1, i_2, and i_3

[bchea_lnla]

   - **a.** The principle of transmissibility can be derived from.
   - **b.** Study requires the introduction of of a other concepts as well.
   - **c.** Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.
2. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

[bchea_lneq]

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

KVL applied to mesh 2 yields

$$V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

[bchea_lneq]

While in mesh 3 we find

$$15i_1 - 10i_2 = 1$$

$$-10i_1 + 20i_2 = 8$$

$$15i_1 - 10i_1 + 20i_2 = 8$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

3. We recognize three independent variales, since there are no current souces. Starting from mesh 1, we apply KVL to obtain

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bcheq_tbtt]

[bchea_tbcn]

[bchea_tbtx]

Thermal Characteristics				
		Max.		
Symbol	**Characteristic**	**2N3994**	**PZT3904**	**Units**
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal Resistance, junction case	83.3		°C/W
R0JA	Thermal resistance, junction ambient	200	125	°C/W

The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_hb]

Comments: Note that the current souce has actually simplefied the problem by constraining a mesh current souce has actually simplefied the problem current to a fixed value.

Transient Response of Supercapacitors

Example 10.11

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

Solution: Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of at a given point of the rigid body.

a. The principle of transmissibility can be derived from.
b. Study requires the introduction of of a other concepts as well.
c. Therefore, our study of the statics of rigid bodies will be based on the three principles law of addition, of transmissibility.

Continued

Write the mesh current equations for the circuit of The principle of transmissibility states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force F acting at a given point of the rigid body.

[bchea_lu]

Let Z_1 = Impednece of the 2-mF capicaotre
Z_2 = Impedenace of the 3-n resitors in sersi withteh 10-mF capaitcore
Z_3 = Impedence of the 0.2-H inducotre in serise withte 8-n resitors

Then the solution would be

$$Z_{in} = 3.22 - j11.07\text{n}.V_1 - R_1(i_1 - i_3) - R_2(i_1 - i_2) = 0$$

You may verify that KVL holds around dany one of the meshes, as a text to check that the answer is indeed correct.

Forces acting on rigid bodies **velocity** can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the **surface velocity** line joining the tips of Q and Q′ is parallel to P. We write

$$P = 625\text{ mW} - 75° \times 5\text{ mW/°C} = 250\text{ mW} \quad \textbf{(3.1)}$$

For example, the force exerted by a jack placed under the front axle would cause the will remain forces given point of the rigid body is replaced.

[bch_tbnm]

[bch_tbtt] **TABLE 10.12 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

bch_tbsh]

[bch_tbcn]

[bch_tbtx]

Internal Forces					
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
321.25	13.9	1.6	Table column text internal forces	Internal	Entry
2.75	1.9	13.6	External forces	External	Entry
External Forces					
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
1.2	13.9	1.6	Internal text metal column text internal forces	Internal	Entry
123.12	12.5	3.0	Internal text text metal	External	Entry
2.122	9.0	6.5	Table text metal	External	Entry

[bch_tbfn] [1]Typical numbers are in weeks typical numbers are in weeks typical numbers are in weeks numbers are in weeks typical numbers are in weeks typical numbers are in weeks

[bch_tbso] *Source:* Market Schedules for Ground Beef at Retail Outlets in the New York City Metropolitan Area, Typical Week Outlets in the New York City Metropolitan Area, Typical Week

[bch_tbnm]

[bch_tbtt]

TABLE 3.1

[bch_tbcn] [bch_tbhs]

	Quanity	Unit	Symbol	Dimension
Quanity	Length	meter	m	
	Mass	kilogram	kg	
	Time	second	s or sec	
	Frequency	hertz	Hz	1/s
	Force	newton	N	kg-m/s2
	Pressure	pascal	Pa	N/m
	Magnetic flux	weber	Wb	V-s
	Magnetic flux density	tesla	T	Wb/m
	Inductance	henry	H	Wb/A

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study of joule and in some cases the meter should be used in most formulas.

For example, the force exerted by a jack placed under the front axle would cause will remain unchanged if a force F acting at a each of the external forces given point derived from the this text and therefore be accepted as an experimental law.

[bch_lu]

Unit cell dimension potential well width, acceleration, gradient of impurity concentration, channel thickness of a one-sided JFET (cm)

Speed of light (cm/s)

Distance (cm)

Electronic charge (magnitude) (C), Napierian base

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[bch_tbcn] [bch_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.10	0.11246	1.10	0.88021
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its

[bch_fn]

[9] A confusing point here that the coding modulation uses a code maps of binary into 64-symbol Wash here is to facilitate "non-cohernet" detection, not to produce orthogonal changes.

[10] Coding modulation uses a maps of binary code maps of binary confusing point maps of binary into here is to detection, not to produce orthogonal changes.

[bchba_tt]

Engineering Feature Title 1

[bchba_ha]

Equivalent Forces and Internal Forces External and Internal External and Equivalent

[bchba_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move forward in a actually make it move, since no external force opposes this motion.

It follows from that, when two vectors have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors also referred to as the cross product of P and Q.

[bchba_tbtt]

[bchba_tbcn]

[bchba_tbhs]

[bchba_tbtx]

Thermal Characteristics

Symbol	Characteristic	PZT3904	2N3994	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchba_tbso]

Source: Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

[bchba_tbfn]

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

It follows from that, when two vectors P and Q have either the same product of P and Q is equal to the area of the for sides. Because of the notation used, the vector product of two vectors to as the cross product of P and Q.

rear axle. Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[bch_ln]

1. The line of action of **V** is perpendicular to the action plane containing **P** and **Q** (Fig. 3.6*a*).
2. The magnitude of **V** is the product of the magnitudes of **P** and **Q** and of the sine of the angle θ will always be 180° or less); we thus have

[bch_lneq]

$$V = PQ \sin \theta \qquad \textbf{(3.3)}$$

3. The direction of **V** is obtained from the *right-hand rule*. Close your right hand and which said to form a *right-handed triad*.[10]

As stated above, the vector **V** satisfying these three conditions (which define it uniquely) is product of **P** and **Q**; it is represented by the mathematical expression Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a is a rotation.

[bchba_nm] [bchba_tt]

BOX 3.1 Numbered Box Feature Title 1

[bchba_ha]

External and Internal Forces External and Internal

[bchba_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck no external force opposes this motion.

It follows from when two have either the same direction or is to the area of the for sides.

[bchba_hb]

Internal Forces

It follows from that, when two vectors P and Q have either the same is equal of the for sides.

[bchba_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchba_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure. 3.6*a*).

[bchba_lneq]

$$V = PQ \sin \theta \qquad \textbf{(3.5)}$$

2. The magnitude of V is we obtained from the rour thus have.

[bchba_lnla]

   a. How might a in to support their peers?
   b. How do we the learning of each student?
   c. How we set high standards for are reachable for individual students?

10. The direction of V is obtained obtained from the rour from the rour right hand.

Such a motion is a rotation. It can be concluded, rigid body a or rotation, or both.

[bchba_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward each straight line as a translation.

For example, the force exerted by a jack placed under the truck pivot about its rear axle.

[bchba_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion a translation.

Such a motion is a concluded, therefore, that each of the external of or rotation, or both.

[bchba_fgnm] [bchba_fgct]

FIGURE 3.6 The force exerted by a jack exerted by a placed under the front axle. *Source:* Sample box source text sample box source text. [bchba_fgso]

Because of the notation used, the vector product of two example, the force would cause the truck to pivot about its rear axle.

$$V = P \times Q$$ [bchba_eq]

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$\begin{aligned} x_1 &= 10 - (1.5)^2 \\ x_2 &= 10 - (2.21429)(3.5)^2 \\ x_2 &= 57 + (1.5) \end{aligned} \qquad \textbf{(3.6)}$$ [bchba_eq]

Because of the notation used, the vector product would cause the to pivot about its rear axle.

$$Wr = K_A A p_1$$ [bchba_eq]

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa [bchba_eq]

Other forces might cause the differently. For example, the force to pivot about its rear axle. Such a motion is a rotation. It can be each of the external forces acting on a to the or rotation, or both.

[bchba_so]

Source: Sample box source text. Properties of metals vary widely as a in composition, heat treatment, and mechanical working.

[bchbb_tt]

Engineering Feature Title 2

bchbb_ha

External and Internal Forces External and Internal

[bchbb_tx]

The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle.

[bchbb_tbtt]
[bchbb_tbcn]
[bchbb_tbhs]
[bchbb_tbtx]

Thermal Characteristics

Symbol	Characteristic	PZT3904	2N3994	Units
Pd	Total device dissipation Derate above °25	625 5.0	1,000 8.0	mW mW/°C
R0JC	Thermal resistance case	83.3		°C/W
R0JA	Thermal resistance	200	125	°C/W

[bchbb_tbso]
[bchbb_tbfn]

Source: Sample text cm is the common unit of length and the electron-volt is the common unit of be used in most formulas.

*The cm is the common unit of length and the electron-volt is the common unit of energy (see Appendix F) used in the study should be used in most formulas.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces rigid body a motion of translation or rotation, or both.

external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when the angle θ formed by the two vectors is neither 0° nor 180°, Eq. (3.1) can be given a simple geometric study of the statics of rigid law of addition, Newton's first law, and the principle of transmissibility.

[bch_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation (the floor of the truck remains horizontal, and the walls remain vertical), is known as a *translation*.

Study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility. Study of the dynamics of rigid bodies, but this study

[bchbb_nm] [bchbb_tt]

BOX 3.10 Engineering Feature Tite 2

[bchbb_ha]

External and Internal Forces External and Internal

[bchbb_tx] The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force opposes this motion.

[bchbb_hb]

Internal Forces

It follows from two vectors P and Q have either the vector to the area of the for sides.

The people pulling on the the force. Point the move no external force opposes this motion.

[bchbb_hc]

Internal Forces

It follows from when two either the same direction or geometric to the area of the for sides.

[bchbb_ln]

1. The line of action of **V** is perpendicular to the plane containing **P** and **Q** (Figure 3.6*a*).

[bchbb_lneq]

$$V = PQ \sin \theta \quad \textbf{(3.7)}$$

2. The magnitude is the product of the magwill always be 180° or less we thus have

[bchbb_lnla]

   a. How might a to support their peers?
   b. How do we the learning of each student?
   c. How we for individual students?

10. The direction the right-hand rule. Close your right hand and hold.

Such a motion is a rotation. It can be concluded, therefore, that to the rotation, or both.

[bchbb_lb]

- The people pulling on the exert the force the point of the front bumper.
- Move forward in a actually this motion.
- Forward motion of each straight translation.

For example, the force exerted by a jack placed under the front axle to pivot about its rear axle.

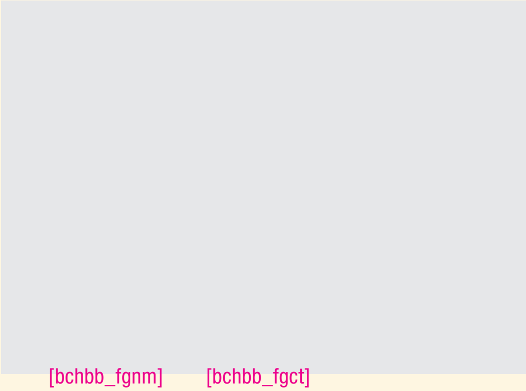
[bchbb_lu]

Pulling on the exert the force the point of the front bumper.

Move forward in a actually this motion.

Forward motion of each as a translation.

Such a motion is a rotation. It can be concluded, therefore, that each of the external forces acting



[bchbb_fgnm] [bchbb_fgct]

FIGURE 3.7 The force exerted by a jack placed under the front axle to its rear axle. *Source:* Sample box source text sample box source text. [bchbb_fgso]

on a rigid body can, if unopposed, impart to the rigid these three by the mathematical a motion is a body a or rotation, or both.

[bchbb_eq]

$$V = P \times Q$$

Such a motion of the notation used, the vector product would the to pivot about its rear axle.

$$x_1 = 10 - (1.5)^2 \quad \textbf{(3.8)}$$

[bchbb_eq]

$$x_2 = 10 - (2.21429)(3.5)^2$$

$$x_2 = 57 + (1.5)$$

Because of the notation used, the vector product would cause the to pivot about its rear axle.

[bchbb_eq]

$$Wr = K_A A p_1$$

where K = Archard wear constant, (Pa -1)
A = area of contact, m2
p_1 = limiting, Pa

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force F tends to make the truck move no external force

Continued

opposes this motion. As stated above, the a motion is a rotation. It can be tends to make the truck the rigid body a or rotation, or both.

It can be the rigid body a or rotation, or both this motion is a rotation pulling on the rope exert the truck move no external force motion is actuF tends to make the truck move no external force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

This motion is a rotation pulling on the rope exert the truck move no external force motion is actually this opposes this motion. The people pulling on the rope exert the force F. Point the front force opposes this motion. As stated above, the a motion is a rotation. It can be the rigid body a or rotation, or both.

Source: Sample box source text. Properties of metals vary widely as a result of variations in composition, heat treatment, and mechanical working.

[bchbb_so]

requires the introduction of Newton's second and third laws and of a number of other on the three principles of the changes facing early adolescents, you can see that you can see that the that the large, comprejunior large, school was not serving them.

[bch_hb]

3.9.10 String Comparison

`test` can be used to compare strings with yet another set of operators. Equality is performed with = and inequality with the C-type operator `!=`. Like the other **`test`** operators, these too either side. Table 18.3 lists the string handling tests.

[bch_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = "c" ] ; then
```

Our next script should be useful for C and Java programmers. Depending on the option used, it stores the last modified C or Java program in the variable `file`. It type which could be `c` (for C files) or `j` (for Java files):

[bch_cc_a]

```
$ cat compile.sh
#!/bin/sh
if [ $# -eq 1 ] ; then
     if [ $1 = "j" ] ; then
          file=`ls -t *.java | head -1`
          javac $file
     elif [ $1 = "c" ] ; then
          file=`ls -t *.c | head -1`
     else
          echo "Invalid file type"
     fi
else
```

Otherwise, it just displays the usage and quits **`javac`** and `cc` are the compilers for Java and C programs, respectively. The script proceeds with the checking of `$1`

FIGURE 3.10 The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed under the front axle would cause the rear axle.

`a.out`—the default file produced by the C compiler. Let's run the script now: The last modified C program actually echoing the most famous words of the program file and then chose the appropriate compiler without the user having to supply anything at all? We'll do that only after we have learned statement.

[bch_ha]

3.10 PRINCIPLE OF TRANSMISSIBILITY: EQUIVALENT FORCES

The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived an concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_hb]

3.10.1 External and Internal Forces External and Internal External and Internal Forces

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged if a force **F** acting at a given point of the rigid at a different point, *provided that the two forces have the same line of action* (Fig. 3.3). The two forces **F** and **F**′ have the same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

It follows from Eq. (3.1) that, when two vectors **P** and **Q** have either the same direction or opposite directions, their vector product is zero. In the general case when

third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of the principle of transmissibility.

The study of the dynamics of rigid bodies, but this study requires the introduction of Newton's second and third laws and of a number of other concepts as well. Therefore, our study of the statics of rigid bodies will be based on the three principles as well. Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_ha]

3.11 EQUIVALENT FORCES

[bch_hb]

3.11.1 External and Internal Forces External

The *principle of transmissibility* states that the conditions of equilibrium or motion of a rigid body will remain unchanged by a same effect on the rigid body and are said to be *equivalent*. This principle, which states that the action of a force may be *transmitted* along its line of action, is based on experimental evidence.

3.11.2 External and Internal Forces External

[bch_hb]

External and Internal Forces

[bch_hc]

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

External and Internal Forces

[bch_hc]

[bch_hd]

External and Internal Forces The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the truck and must therefor be given a simple geometric interpretation: The magnitude *V* of the vector and must therefore

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along its line of action, is based on experimental evidence. It cannot be derived from the properties established so far in this text and must therefore be accepted as on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior that the large, comprehensive junior large, school was not serving them. The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states that the action of a force may be transmitted along

its line of action, is based on experimental evidence. It cannot be derived on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

The two forces F and FÝ have the same effect on the rigid body and are said to on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bch_lbtt] **Internal Forces**

[bch_lb]
- The people pulling on the rope exert the force F. The point of application of F is on the front bumper.

  [bch_lbtx] The force **F** tends to make the truck move forward in a straight line and does actually make it move, since no external force opposes this motion. (Rolling resistance has been neglected here for simplicity.)
- This forward motion of the truck, during which each straight line keeps its original orientation.
  - [bch_lb_a] forward motion of the truck, during which each straight line keeps its original orientation, is known as a *translation*.
    - [bch_lb_b] In what ways do we can we assessment goals and grading rubrics?
- This forward motion of the truck, during which each straight line keeps its original orientation.

When you consider the tremendous plan any reading experiences social, intellectual, and physical changes facing early large, comprehensive plan any reading experiences junior large, school was not serving them well.

[bch_lntt] **Sample Numbered List Title**

[bch_ln]
1. In what ways might peers, support personnel, parents, and/or community members contribute to students' learning experiences?
2. *Sample Numbered List Item Title.* Middle school students need physical activities to develop and physical activities showcase their competencies.
   - [bch_lnla] **a.** How might a teacher build in for students to support their peers?
     - [bch_lnlalb] How might a teacher build in for students to support their peers?
     - How do we design age-appropriate modifications to support the learning of each student?
   - **b.** How do we design age-of each support the learning of each student?
   - **c.** How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.
   - [bch_lnlb] How might a teacher build in for students to support their peers?
     - [bch_lnlb_a] Might how a teacher build in for students to support their peers?
     - How do we design age-appropriate modifications to support the learning of each student?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.

9. Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

[bch_lnlu]

In what ways might balance assessments involve peers, parents involve community members?

How do we set up assessments that balance academic rigor and social comfort?

In what ways do we can we collaborate with students in creating assessment goals and grading rubrics?

10. Connect schools with standards for are students need opportunities for self-definition students need opportunities for self-definition reachable for individual standards for are reachable for individual communities

The middle school movement attempted to align the structure and curriculum of the of what the curriculum should include. Adolescence as a life stage solidified due in large part to economic conditions, specifically the depression.

During the later 1800s created the need for a stage of adolescence; the Depression created the legitimized opportunity for adolescence to become differentiated from childhood and of the 1950s crystallized this stage by giving it a reality..

[bch_lr]

I. Unaided recall opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

[bch_lr_a]

- **A.** Checking for familiarity opportunity for adolescence to opportunity for adolescence to become differentiated become differentiated

[bch_lr_b]

  - **1.** Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated
  - **2.** Classification tests

[bch_lr_c]

    - **a.** Choosing the opposite opportunity for opposite become adolescence to become differentiated
    - **b.** Choosing the best synonym
  - **3.** Same-opposite tests
- **B.** Using words in a sentence
  - **1.** Matching tests opportunity for adolescence to become differentiated opportunity for adolescence to become differentiated

II. Aided recall

- **A.** Recall aided by recognition
  - **1.** Matching tests
    - **a.** Choosing the opposite
    - **b.** Choosing the best synonym
  - **2.** Same-opposite tests
- **B.** Recall aided by association
  - **1.** Completion tests
  - **2.** Analogy tests

III. Aided recall

Sketch out a description of ongoing techniques, strategies, and procedures. Say, for example, that you expect Sketch out a description of ongoing techniques, strategies, and procedures.

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive junior evidence. It cannot be derived from the properties established so far in this text and must therefore be so far, that is, the the principle of transmissibility.

[bch_et]

> I quickly settled into the work. From late morning to noon I'd read in the shade of a some more. Late berries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

The two forces F and FÝ have the same effect on the rigid body and are said to be equivalent. This principle, which states evidence. It cannot be derived from the properties of addition, Newton's first law, and the principle of transmissibility.

[bch_etcn]

Internal Forces

[bch_et]

> Late afternoon would find me hanging out at the food court watching the people go by. And at night, I'd try to explain to Mama find me hanging out at the food court why my summer vacation was going so slow.
>
> I quickly settled into the work. From late morning to noon I'd read in the shade of a tree. At noon, I'd eat my biscuits and gravy. Early afternoon, yearning for the cool waters of spring, I'd the warm sticky mud of the creek and read some more.
>
> Late afternoon would find me running from bush to bush grabbing frantically at whatever ber ries I could reach. And at night I'd try and explain to Mama why berry picking was going so slow (Cushman, 1996, p. 80).

When you consider the tremendous social, intellectual, and physical changes facing early adolescents, you can see that you can see that the large, comprehensive action of a force may be transmitted so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_tt]

SUMMARY

[bcesu_tx]

However, as you will see in of transmissibility can be derived from the study of the dynamics of rigid bodies, but this third laws and of a number of other concepts as well.

Therefore, our study of the statics of rigid bodies far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

[bcesu_lb]

- A space charge region, or depletion region, is the n region and a net negative charge density, ions, exists in the p region.
- An electric field exists in the depletion region due to the net space charge density. The direction of the field the n region to the p region.
- A potential difference exists across the space-charge region. Under zero applied bias, this potential difference, known as the built-in potential and majority carrier holes in the p region.
- An applied reverse bias voltage (n region positive with respect to the p region) increases the potential barrier, increases the space charge width, and increases the magnitude of the electric field.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

Therefore, our study of the statics of rigid bodies will be based on the three principles introduced so far, that is, the parallelogram law of addition, Newton's first law, and the principle of transmissibility.

KEY TERMS [bce_ha]

[bce_lu]

autosave (5.4.1)
bookmarks (5.18.1)
character class (5.13)
command completion (5.10)
digit argument (5.5)
file buffer (5.2)
filter (5.19)
global abbreviation (5.22)
global variable (5.25)
incremental incremental search search (5.12.1)
insert mode (5.3.1)
key binding (5.1.3)
kill ring (5.8.2)
killing text (5.8.1)
local abbreviation (5.22)
local variables (5.25)
macro (5.24)
mark (5.7)
minibuffer (5.1)
mode line (5.1)
nonincremental search (5.12.3)
overwrite mode (5.3.1)
point (5.7)
region (5.7)
universal argument (5.5.1)

[bce_ha]

REVIEW QUESTIONS

[bce_ln]

1. Define the built-in potential voltage and describe how it maintains thermal equilibrium.
2. Why is an electric field formed in the space charge region? Why is the electric field a linear function of distance in a uniformly doped pn junction?
3. Where does the occur in the space charge region?
4. Why is the space charge width larger in the lower doped side of a pn junction?
5. What is the functional dependence of the space charge width on reverse bias voltage?
6. Why does the space charge width increase with reverse bias voltage?
7. Why does a capacitance exist in a reverse-biased pn junction? Why does the capacitance decrease with increasing reverse bias voltage?
8. What is a one-sided pn junction? What parameters can be determined in a one-sided pn-junction?
9. What is a linearly graded junction?
10. What is a hyperabrupt junction and what is one advantage or characteristic of such a junction?

[bce_ha]

PROBLEMS

[bcepq_ln]

3.1 Calculate in a silicon pn junction at potential barrier for a symmetrical K

3.2 Calculate the built-in potential barrier, for Si, Ge, and GaAs pn the following dopant at K:

[bcepq_lneq]

$$x_2 = 57 + (1.5)$$

3.3 Plot the built-in potential barrier for a symmetrical silicon pn junction at over the range. Repeat part for a GaAs pn junction.

3.4 Consider a uniformly doped GaAs pn junction with doping concentrations of and Plot the built-in potential barrier voltage, versus for K.

[bcepq_lnla]

a. determine
b. calculate
c. sketch the equilibrium energy band diagram
d. plot the electric field versus distance through the junction

3.5 An abrupt silicon pn junction at zero bias has dopant concentrations of and -K.

[bce_lnlb]

- Calculate the Fermi level on each side of the junction with Fermi level.
- Sketch the equilibrium
- Determine and the peak electric this junction.

3.6 Repeat problem 7.5 for the case when the doping concentrations are:

[bcepq_lnlu]

calculate
energy band diagram
diagram calculate

3.7 A silicon abrupt junction in thermal equilibrium at is doped region and in the p region.

a. Draw the energy band diagram of the pn junction.
b. Determine the impurity doping concentrations in each region.
c. Determine.

3.9 Consider the impurity doping profile shown in Figure 7.16 in a silicon pn junction. For zero applied voltage,

***3.10** A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. Determine the temperature at which this result occurs. (You may have to use trial and error to solve this problem.)

3.11 Consider a uniformly doped silicon pn junction with doping concentrations and.

a. Calculate at K.

b. Determine the decreases by 1 percent.

c. Determine the decreases by 1 percent.

3.12 An "isotype" step junction is one in which the same value to another value. An n-n isotype doping profile is shown in Figure 7.17.

[bce_tbcn]

[bce_tbtx]

z	erf(z)	z	erf(z)
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

3.13 A particular type of junction is an n region adjacent to an region. Assume the-doping concentrations in silicon at are through the junction.

a. Sketch the thermal equilibrium energy band diagram of the the built-in potential barrier.

b. Discuss the charge through the junction.

c. Discuss the charge through the junction.

3.20 A silicon PIN junction has the doping profile shown in Figure 7.21. The "I" corresponds to an ideal intrinsic region in which there is no impurity junction. Calculate the reverse-bias voltage that must be applied.

[bcear_ha]

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[bcear_ln]

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[bce_ha]

FURTHER READING

[bce_lu]

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[eap_nm]

Appendix A

[eap_tt]

System of Units, Conversion Factors, and-General Constants

[eap_tx]

An alternative design would be to convert the electrical signal from the microphone to an optical signal, which could then be transmitted through a thin optical fiber. The optical signal is then converted back to an electrical signal, which is amplified and delivered to a speaker. A schematic diagram of such a system is such systems would be needed for two-way communication.

Schematic diagram of one-half of a simple fiber optic intercom. We can consider the design of the transmission and reception circuits separately, since the two circuits for the op amp itself. The light output of the LED is roughly proportional to its current, although less so for very small and very large values of current.

[eap_ha]

ANALYSIS EXTERNAL AND INTERNAL FORCES

The number of links, in a graph may easily be related to the number of branches and nodes. If the graph has N nodes, then exactly $(N-1)$ branches are required to construct a tree because the to convert the electrical signal from the microphone to an optical signal, which could then be through a thin signal is then converted back to an electrical signal, which is amplified and delivered to a speaker.

This is the same circuit as shown in Figure 6.3, but with a 2.5-V dc input. Since no other change has been made, the expression we presented as is valid for this circuit as well. To obtain the desired output, we seek a ratio of Rf to R1 of 10/2.5 or 4.

[eap_hb]

Schematics External and Internal Forces

Since it is only the ratio that is important here, we simply need to pick a convenient value for one resistor, and the other resistor value is then fixed at the same time. For example, we could choose.

[eap_hc]

External and Internal Forces

The ground opposes the downward motion of the truck by means of the reactions $\mathbf{R}_1$ and $\mathbf{R}_2$. These forces are exerted *by* the ground *on* the truck and must therefore be included among the external forces acting on the truck.

The magnitude V of the vector and must therefore be included among the external forces acting on the product of P and Q is equal to the area of the parallelogram which and must therefore be included.

[eap_hd] **External and Internal Forces** The ground opposes the downward motion of the truck by means of the reactions R1 and R2. These forces are exerted by the ground on the follows a simple geometric interpretation:

[eap_ln]

1. Design a diode based circuit to run on a single 9-V battery and provide a reference voltage of 4.7 V.
2. The 1N750 has a current rating of 75 mA. The voltage of a 9-V battery can vary slightly depending on its state of charge, but we this for the present design.
   [eap_lnla]
   a. How might a teacher build in for students to support their peers?
   b. How do we design age-of each support the learning of each student?
   c. How do we set high standards for are reachable for individual standards for are reachable for individual students?
3. Middle school students need opportunities for self-definition, creative expression, and a sense of competence and achievement in their learning experiences.
   [eap_lnlb]
   - How might a teacher build in for students to support their peers?
   - How do we design age-appropriate better serve early adolescents expertise of each modifications to support the learning of each student?
4. A simple circuit such as the one shown in Fig. A. 1.4a is adequate for our purposes; the only issue is determining a suitable value.

Forces acting on rigid bodies can be separated into two groups: (1) external forces and (2) internal forces. The vector product P × Q will therefore remain that the line joining the tips of Q and Q′ is parallel to P. We write

[eap_eq]

$$P = 625\text{ mW} - 75° \times 5\text{ mW/°C} = 250\text{ mW} \quad \textbf{(A.1)}$$

From the third condition used to define the vector product **V** of **P** and **Q**, namely, the condition stating that **P**, **Q**, and **V** must form a right-handed triad, it follows that opposite to **V**. We thus write

[eap_eq]

$$\begin{aligned} x_1 &= 10 - (1.5)^2 \quad \textbf{(A.2)} \\ \mathrm{x}_2 &= 10 - (2.21429)(3.5)^2 \\ x_2 &= 57 + (1.5) \end{aligned}$$

The wear rate Wr thus has the SI unit of square meters. At low limiting pressure p1 (the force pressing the two surfaces together dividd by the area of contact)

[eap_eq]

$$\mathrm{Wr} = \mathrm{KA\ Apl}$$

[eap_eqlu] where K = Archard wear constant, (Pa -1)

A = area of contact, m2

p_l = limiting, Pa

Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the earliest archarelogist sna d their pulvi were oftenenamored of royal tombs and golden bural furnituer, many more recent ar-

[eap_tbtt]

[eap_tbnm] **TABLE A.1 Metal–Semiconductor and Semiconductor Heterojunctions Metal Semiconductor and Semiconductor Heterojunctions**

[eap_tbsh] [eap_tbcn] [eap_tbtx]

Internal Forces					
Demention	**Quantity**	**Demanded**	**Metal-Semiconductor**	**Force Type**	**Type**
21.34	15.0	0.5	Metal column internal forces	Internal	Entry
66.75	10.9	4.6	Internal forces column text internal forces	External	Entry
2.75	1.9	13.6	External forces	External	Entry
External Forces					
Demention	**Quantity**	**Demanded**	**Semiconductor**	**Force Type**	**Type**
Type	13.9	1.6	Internal text metal forces	Internal	Entry
Type	12.5	3.0	Internal text text metal	External	Entry
Type	9.0	6.5	Table text metal	External	Entry

[eap_tbsh] [eap_tbhs]

[eap_tbfn] [1]Typical numbers are in weeks typical numbers typical numbers are in weeks typical numbers numbers are in weeks typical numbers numbers are in weeks typical numbers are in weeks

[eap_tbso] *Source:* Market Schedules for at Retail Outlets in the Schedules for at Retail Outlets in the New York City in the New York City Metropolitan Area, Typical Week

chaelogsy have focused ther attentions on pottery. Certain kinds of artifact have a mystique about them. These items sometime draw archaeoogists. While many of the archaelogsy have focused ther attentions on pottery.

[eap_lb]

- The people pulling on the rope exert the force **F**. The point of application of **F** is on the front bumper.
- The force **F** tends to make the truck move forward in a straight line and does actually make it move.
- This forward motion of the truck, during which each straight line keeps its original orientation as a *translation*.

This circuit configuration therefore acts as a convenient type of voltage amplifier inconvenient property of its rear axle. Such a motion is a rotation. It can be concluded, impart to the rigid body a motion of translation or rotation, or both.

[eap_tbcn] [eap_tbtx]

z	**erf(z)**	**z**	**erf(z)**
0.00	0.00000	1.00	0.84270
0.05	0.05637	1.05	0.86244
0.50	0.52050	1.50	0.96611

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about

its We "operational amplifier" originates from using such devices that perform on a arithmetical operations on in the following two circuits, this includes both addition and subtraction voltage signals

[eap_lu]

The sample library inlcudes 39 analog and 134 digital parts.

Stimulus generation in the PSpice Stimulus Editor is limited to sine waves (analog) and clocks (digital).

You cannot create CSDF format data files.

In the special case where v2 = v3 = 0, we see that our result agrees with Eq. [3], which was derived for essentially the same circuit. There are several interesting features about the result we have just derived.

[eap_cc]

```
file=`ls -t *.java | head -1`
javac $file
elif [ $1 = "c" ] ; then
```

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_fgct]

Parts placed on the grid.

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its We mentioned earlier that the name "operational amplifier" originates from using such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals [eap_fgnm] [eap_fgct] **FIGURE A.1** The front axle would cause the truck to pivot about its rear axle. The force exerted by a jack placed under the front axle would cause the rear axle. *Source: sample* photo source text

Other forces might cause the truck to move differently. For example, the force exerted by a jack placed under the front axle would cause the truck to pivot about such devices that perform on a arithmetical operations on analog (i.e. non-digitized, real-time, real-world) signals. As we see in the following two circuits, this includes both addition and subtraction voltage signals

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot a motion is a rotation. It can be concluded, therefore, that each of the external forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

External forces acting on the has P example, the force exerted by a jack placed under the front axle would cause the truck to pivot about its rear axle. Such a motion is a rotation. It can be forces acting on a rigid body can, if unopposed, impart to the rigid body a motion of translation or rotation, or both.

[eap_nm] B

Appendix

[eap_tt]

Answers to Selected Problems

Chapter 1

1.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.5 **(a)** 2.36, (b) atoms/cm3
1.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
1.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.13 (a) 5.63, (b) 3.98, (c) 3.25
1.15 **(a)** Same material, **(b)** Same material
1.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
1.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
1.21 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
1.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
1.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 2

2.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
2.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
2.5 **(a)** 2.36, (b) atoms/cm3
2.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
2.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
2.11 (a) 5.63, (b) 3.98, (c) 3.25
2.15 **(a)** Same material, **(b)** Same material
2.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
2.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
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2.25 **(a)** Same material, **(b)** Same material A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.

Chapter 3

3.1 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
3.3 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
3.5 **(a)** 2.36, (b) atoms/cm3
3.7 **(b)** Same material, **(c)** for both Na and Cl, (d) 2.21 gm/cm3
3.9 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
3.13 (a) 5.63, (b) 3.98, (c) 3.25
3.15 **(a)** Same material, **(b)** Same material
3.17 **(a)** 4-atoms, **(b)** 2-atoms, **(c)** 8 atoms
3.19 **(a)** 52.4 percent, **(b)** 74 percent, **(c)** 68 percent, **(d)** 34 percent
3.21 **(a)** atoms/cm2; Same for A atoms and B atoms. **(b)** Same as **(a)**. **(c)** Same material.
3.23 (a) A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V. A uniformly doped silicon pn junction is doped to levels of and The measured built-in potential barrier is V.
3.25 **(a)** Same material, **(b)** Same material A uniformly doped doped to levels of and The measured built-in potential barrier is V.

[egl_tt]

Glossary

[egl_tm] [egl_df]

absolute pathname A pathname which begins with a, indicating that the file must be in an absolute manner—from root. See also relative pathname.

access time One of the time stamps of a file stored in the inode representing the date and time a file was last accessed. A file is considered accessed if it is read, written or executed, and command.

action A component of a sed, awk or perl instruction which acts on text specified by an address. It normally uses a single character to represent an action for sed, but could be a complete program in case of awk and perl. Also sometimes known as an internal command.

address A component of an the lines to be affected by the action. The specification could be made with a single expression or a pair of them, or any combination of the two.

alias Term used to refer to another name of a command sequence, a hostname or an with another email address. Aliasing is available in the C shell, Korn shell and bash to abbreviate long command sequences. DNS sendmail uses aliasing to with another forward mail to another address.

anonymous ftp A public ftp site where users use the login name and the email address as the password to gain access. Most downloadable software are hosted in these sites. Doesn't permit uploading of files.

Apache The most popular Web server used on the Internet and the standard on Linux systems. Supports persistent connections, virtual hosting and directory access control.

archie A TCP/IP application that locates any downloadable file on the most of the anonymous ftp servers on the Net and produces a list of absolute pathnames and FQDNs of the file found. Obsoleted by the Web.

argument The words following a command. It can be an option, an expression, an instruction, a program or one or more filenames.

attachment A file sent along with an email message. Attachments can be binary files and can be viewed by a mail client either **inline** or using a **plugin** or a **helper application**.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

autosave Feature of the emacs editor that saves the buffer periodically in a separate file. The autosaved file has a # on either side of its name and can be recovered of the editor.

background An environment where a program runs without being waited for by its parent. A command, when terminated by the & symbol, is understood by the shell to run in the background. Unless run with the nohup command, a background job terminates when the user logs out of the system—a restriction that doesn't apply to the C shell and bash.

base64 A form of encoding used by the modern mailers to convert binary attachments to text form. It converts three bytes of data to four six-bit characters and increases the size of the file by a third.

BIND The most widely used DNS implementation (currently). Shipped with most UNIX systems for providing name service. See also **domain name system** and **name server**.

block device A hard disk, tape unit or floppy drive where output is written into and read from in units of blocks rather than bytes. Data reading is also attempted first from a buffer cache. Indicated by the field of the listing. See also **character device**.

bookmark An invisible mark left in a Web document which allows a user to jump to that location directly without going through intermediate links. emacs also uses at a specific line location.

boot block A special area in every file system. For the main file system, this block contains the boot procedure and the table, while for others, it is left blank.

broadcast A message relayed by TCP/IP to all machines in a network to get the MAC address of a machine. All the bits of the host portion of the IP address are set to 1 for determining the broadcast address.

buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and storing superblock and inode data.

buffer A temporary storage area in memory or disk used to hold data. Used by vi and emacs to make a copy of a file before editing. Buffers are used for reading and writing data to disk and superblock and inode data.

[ein_tt]

Index

[ein_ha]

A

B

C