Rc hibbeler statics and dynamics 14th edition solutions

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This textbook survival guide was created for the textbook: Engineering Mechanics: Statics & Dynamics, Edition: 14. Engineering Mechanics: Statics & Dynamics was written by ISBN and is associated with the ISBN: 9780133951929. Chapter 1 includes 21 full Step-by-step solutions. Since 21 problems have been answered in chapter 1, more than 191394 students have seen full step-by-step solutions of this chapter. This survival guide of the expansive textbook covers the following chapters and their solutions. Chapter 17 includes 120 full step-by-step solutions. This survival guide of the expansive textbook covers the following chapters and their solutions. Since 120 problems have been answered in chapter 17, more than 193374 students have seen full step-by-step solutions of this chapter. Engineering mechanic: Statics & Dynamics was written by and is associated with ISBN: 9780133951929. This textbook survival guide was created for the textbook: Engineering Mechanics: Statics & Dynamics, Edition: 14 . Establish of rigid bodies 14 by RC Hibbeler, Problem 1-5 Solve: Part A \ Begin {align *} 45 \ 320 \ \ text {kN} & = 45.3 \ Times 10 ^ 3 \ text {kN} \\\ 45.3 \ Times 10 ^ 3 \ Times 10 ^ 3 \ text {n} \ & gt; = 45.3 \ Times 10 ^ 6 \ text {n} \ & gt; 45.3 \ text {MN} \ end {align *} part B \ begin {align *} 568 \ left (10 ^ 5 \ right) \\ text {mm} & gt; = 568 \ Left (10 ^ 5 \ Right) \ Times 10 ^ {- 3} \ text {m} \ & gt; = 568 \ Times 10 ^ 2 \ text {m} \ = 56.8 \ Times 10 ^ 3 \ text {m} \\ & gt; 56km} \ end {align * part c \ begin {align *} 0.00563 \ text {mg} & gt; 5.63 \ Times 10 ^ {- 3} \ text {mg} \\ & = 5.63 × 10 ^ {- 3} \ times 10 ^ {- 3} \ text {g} \ & gt; 5.63 \ Times 10 ^ {- 6} \ text {g} \ = 5.63 \ mu \ text {g} \ end {align *} statics of rigid bodies 14th by rc hibbeler, problem 1-4 solution: part a \ begin { align *} 200 \ text {lb} \ cdot \ text {ft} & gt; \ left (200 \\ text {lb} \ cdot \ text {ft} \ right) \ left (\ frac {4.4482 \ text {n} {1 \ text {lb}}} \ right) \ left \end{align* Part B350 \text{lb/ft}^3& = \left (\frac{350\ \text{lb}}{1\ \text{ft}^3} \right) \left (\frac{1\ \text{ft}}{0.3048\ \text{m}}} \right) ^3\left (\frac{4.4482\text{N}{1\ \text{lb}} \right) \left (\frac{1\ \text{kN}}{1000\ \text{N} \right) \\ & = 55.0\ \text{kN/m}^3 \end{align*} Part C \begin{align*} 8 \text{ft/hr}& = \left (\ frac{8\ \text{ft}}}{1\ \text{hr}}}}} \right) \left (\frac{1\ \text{hr}}{3600\ \text{s} \right) \left (\frac{0.3048\ \text{m}{1\ \text{ft}}}} \right) \left (\frac{1000 \text \text \text \text \text \text \text{mm}{1 \text{m}} \right) \\ & = 0.677\ \text{mm/s} \end{align*} Static of rigid bodies 14th edition by RC Hibbeler, Problem 1-3 Solutions Part A \begin{align*} \text{Mg/ms} & = \frac{10^3 \text{ kg}{10^{-3} \text{s} \\ & = 10^6 \text{kg/s}\ & = \text{Gg/s}\\end{align*} Part B \begin{align*} \text{align*} \text{align*} \text{align*} \text{align*} \text N/mm} & = \frac{1\ \text{N}}{10^{-3} \text{m}\ & = 10^3 \text{N/m}\ & = \text{kN/m} \end{align*} Part C \begin{align*} \frac{\text{mN}}}{\left (\text{kg} \cdot \mu \text{s} \right) } & = \frac{10^{-3} \ \ \text{N}}{10^{-6} \ \ \text{kg} \cdot \text{s}\\ & =10^3 \text{N}/\left (\text{kg} \cdot \text{s} \\ & = \text{kN}/\left (\text{kg} \cdot \text{s}\right) \end{align*} First we have to find the angle that the T force makes with the positive x-axis. We call this the beta angle, equal 2. This is represented in the free-body diagram. Free-body diagram: Solving the values of the angles ÃÂ± and Â©2. \begin{aligned} \tan \alpha & = \dfrac{3}{4} \\ \alpha & = \tan ^{-1} \frac{3}{4} \\ \alpha & = 36.8699 \degree \\ \end{aligned} Knowing that the sum of angles ÃÂ± and Â©2 is 90Â°, we can solve for Â2 . \begin{aligned} \alpha + \beta & = 90\degree \\ \beta & = 90 \degree â \alpha \\ \beta & = 90 \degree â 36.8699 \degree \\ \beta & = 53.1301 \degree \degree \degree \degree \end{aligned} Equilibrium Equations sum of forces in the x-direction: \begin{aligned} \xrightarrow{+} \suma F_x & = 0 \\ T \beta â \frac{4}{5} F & = 0 \\ T \cos 53,1301 \degree â \frac{4}{5} F & = 0 & \qquad \qquad (1) \\ \end{aligned} \end{aligned} of forces in the direction and: \ begin {aligned} + \ ugarrow \ SUM F_Y & = 0 \\ 9 - \ Frac {3} {5} F- t \ Sin β & quot; = 0 \\ t \ sin 53.1301 \ Degree + \ Frac {3} {5} F & quot; = 9 & quot; \ Qquad \ Qquad (2) \\ end {aligned} Now, we have two equations with two strangers. We will resolve the strangers, solving these equations simultaneously. We can use our calculator, or we can solve this manually using the replacement method. Using the equation (1), resolve for T in terms of F. {5} F & quotin = 0 \\ t \ c 53.1301 \ Degree & quot; = \ FRAC {4} {5} F \\ T = \ DFRC {4} {5} F} {\ cos 53.1301 \ degree} \ qquad \ Qquad (3) \\\ end {aligned} Now, replace this equation (3) to equation (2) to solve F: \ BEGIN {ALIGNED} T \ without 53.1301 \ Degree + \ Frac {3} {5} F = 9 \\ LEFT (\ DFRC {\ Frac 4} {5 } {\ cos 53.1301 \ Degree} \ Right) \ Sin 53.1301 \ Degree + \ Frac {3} {5} F \ Left (\ DFRC {\ SIN) { 3} \ c} {3} \ c} \ c \ c} \ c \ c} \ c} \ c} \ c} {3 \ c} \ c} \ c \ c} \ c} \ c} \ c \ c} \ c \ c} \ c \ c \ c} {3 \ c} \ c \ c \ c} \ c \ c \ c \ c} \ c} \ c} Replace the value of F to equation (3) to resolve for T: \ begin {aligned} T & quot; = \ dfrac {4} {5} {\ cos 53.1301 \ degree} \\ t & quot; = \ dfrac {4} {5} \ cdot \ left (5.4 \ text {kN} →} {\ cos 53.1301 \ degree} \ fn0} \ f} \ fn \ f } \ f} {\ f} \ f} \ f} \ f} \ f} \ fn9} \ fn9} \ f} \ fn9} \ f} \ fn} \ p] thus, f = 5.4 \ \ text {kn} and t = 7.2 \ text {kN}. Roller free body diagram: equilibrium equations: Keep in mind that if we take the sum of forces in direction X, there are two unknown forces involve, but if we take the sum of forces in the direction and, only there is an unknown force implies . Summotion of Forces in the Y-Direction: \ begin {aligned} + \ Uparrow \ Sum F_Y & quot; = 0 puls & quot; & quot; 125- n_c \ cos 40 \ degree & quot; & quot; & quot; & quot; N_c & quot; = \ dfrac {125} {\ cos 40 \ degree} & quot; {\ end \\ c \ c \ c] summature of forces x address: \begin{aligned} \xrightarrow{+} \suma F_x & =0 \\ N_B â 163.1759\ \sin 40 \degree &=0 \\ N_B &=163.1759 \sin 40\degree \\ N_B & = 104.8874 \text{N} \end{ Therefore, the normal reactions NB and NC in the bearing at its points of contact B and C for equilibrium are 163.1759 N and 104.8874 N, respectively. Free-body diagram: Equation of equilibrium: Sum of forces in the x-direction: \begin{aligned} \xrightarrow{+} \: \sum F_x & = 0 & \\ 5 \: \text{kN}+F \sin \theta â 8 \: \text {kN} \cos 30 \degree â 4\: \text{kN} \cos 60 \degree & = 0 & \\ F \sin \theta &= 3.9282 & (1) \end{aligned} Sum of forces in the direction y: \begin{aligned} +\arrow \sum F_y & = 0 &\\ 8 \sin 30 \degree â 4 \sin 60 \degree F \cos \theta & = 0 &\\ F \cos \theta & = 0.5359 & (2) \\ \end{aligned} Now we have two equations. Divide the Ecu (1) by (2) \begin{aligned} \dfrac{F \sin \theta}{F \cos \theta} &= \dfrac{3.9282}{0.5359} \\ \dfrac{ \sin \theta}{ \cos \theta} & = 7.3301 \\\end{aligned} We know that \tan \theta = \dfrac{\sin \theta}{\cos \theta}: \begin{aligned} \tan \theta &=7.3301 \\\theta & = \tan^{-1}7.3301\\\\\\textcolor{blue}\theta & \theta & \theta textcolor{blue}{=82.2\degree}\\\end{aligned} result to equation (1), we have \begin{aligned} F\sin 82.2 \degree & = 3.9282 \\ \textcolor{blue}F & \textcolor{blue}{=3.96 \text{kN}}}} \end{aligned} Figure 3.1/3.2 Free-body diagram: Equations of equilibrium: The sum of forces in the x direction \begin{aligned} \sum F_x & = 0 &\\ 6 \sin 70 \degree + F_1 \cos \theta â 5 \cos 30 \degree â \dfrac {4}{5} \left (7 \right) & = 0 & \\ F_1 \cos \theta & = 4.2920 & (1) \end{aligned} The sum of forces in the direction y: \begin{aligned} \sum F_y & =0 & \\ 6 \cos 70 \degree+5 \sin 30 \degree â F_1 \sin \theta â \dfrac{3}{5} \left (7 \right) & =0 & \\ F_1 \sin \theta &=0.3521 & (2) \\ \end{aligned} We came up with two equations with unknowns F_1 and \theta . To solve the equations simultaneously, we can el el of substitution. Using equation 1, solve F_1 in terms of \theta . \begin{aligned} F_1 \cos \theta & = 4,2920 &\\ F_1 & =\dfrac{4,2920}{ \cos \theta } & (3) \\ \end{aligned} Now, replace this equation (3) with equation (2). \begin{aligned} F_ 1 \sin \theta & = 0.3521 \\\\left (\dfrac {4.2920}{\cos \theta} \right) \sin \theta & =0.3521 \\ 4,2920 \cdot \dfrac{\sin \theta}{\cos \theta} & = 0.3521 \\\ 4.2920 \tan \theta & = 0.3521 \theta & = 0.3521 \theta\ \tan \theta & = \dfrac{0.3521}{4.2920} \\ \theta &= \tan ^{-1} \dfrac{0.3521}{4.2920} \\ \theta & = 4.69 \degree \end{aligned} Replaces the solved value of \theta to equation (3). \begin{aligned} F_1 & = \dfrac{4.2920}{\cos \theta} \\ F_1 &= \dfrac{4.2920}{\cos 4.69 \degree} \\ F_1 & = 4.31 \text{kN} \end{aligned} Therefore, the answers to the questions are: \begin{aligned} F_1= & \:4.31 \:4.31 \: \text {kN} \\ \theta = & \: 4.69 \degree \end{aligned} Figure 3.1 Free body diagram: Equations of equilibrium: T Take the sum of the horizontal forces considering the forces to the positive right, and equal it to zero. \begin {aligned} \sum{F}_x &= 0 & \\ F_1 \cos{60 \degree}+F_2 \sin{70 \degree}-5\cos{30 \degree}-\dfrac{4}{5}\left (7\right) &= 0 &\ 0.5F_1+0.9397F_2&=9.9301 & (1) \\ \end {aligned} Take the sum of the vertical forces considering the positive upward forces, and equal it to zero. \begin{aligned} \suma F_y&=0 &\ - F_1\sin60\degree+F_2\cos70\degree+5\sin30\degree-\dfrac{3}{5}\left (7\right) &=0 &\\ -0.8660F_1+0.3420F_2&=1.7 & (2) \\end{aligned} Now, we have two equations with two unknowns F_1 and F_2. So, we have a system of two equations. We can solve this using algebra, or we can directly use our calculator with this capability. The answers are F_1=1,83 \: \text{kN}\\ F_2=9,60 \: \text{kN} \text{kN}

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