

Cap. 11 – Beer e Johnston

11 – $k = 22,50 \text{ m}^3/\text{s}^2$; $v = 6,32 \text{ m/s}$

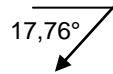
39 – a) $v_C = -8 \text{ m/s}$; b) $v_W = -4 \text{ m/s}$; c) $v_{C/E} = -12 \text{ m/s}$; d) $v_{W/E} = -8 \text{ m/s}$

47 – $t = 2 \text{ s}$; $\Delta y = 9,36 \text{ cm} \downarrow$

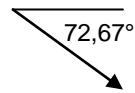
87 – $v_0 = 13,05 \text{ m/s}$

93 – $d_B = 8,55 \text{ m}$ e $d_C = 11,50 \text{ m}$

107 – $r_{B/A} = 772,54 \text{ m}$



117 – $v_{ch} = 36,70 \text{ km/h}$



123 – a) $a = 1,97 \text{ m/s}^2$; b) $a = 1,50 \text{ m/s}^2$

129 – a) $\rho = 7,73 \text{ m}$; b) $\rho = 7,73 \text{ m}$

139 – a) $\vec{v} = -25 \frac{\text{mm}}{\text{s}} \vec{l}_r + 25 \frac{\text{mm}}{\text{s}} \vec{l}_\theta$; b) $\vec{a} = 25 \frac{\text{mm}}{\text{s}^2} \vec{l}_r - 125 \frac{\text{mm}}{\text{s}^2} \vec{l}_\theta$

145 – $v = \frac{b}{\cos^2 \theta} \dot{\theta}$

149 – $v = 851,54 \text{ km/h}$

169 – $R = \frac{2v_0^2}{g} \text{tg} \beta \text{sec} \beta$


171 – $\alpha = 48,67^\circ$

cap. 12 - Beer

03 - $a = 0,98 \text{ m/s}^2$; 100 N

11 - $T = 1040,54 \text{ N}$; $a_A = 6,6 \text{ m/s}^2$ $\swarrow 30^\circ$; $a_B = 3,3 \text{ m/s}^2 \uparrow$

19 - $\Delta x = 41,19 \text{ m}$.

29 - $v_{B/A} = 3,08 \text{ m/s}$


35 - $v = 4,88 \text{ m/s}$

37 - $v = 3,0 \text{ m/s}$

39 - $2,61 \text{ m/s} < v < 3,43 \text{ m/s}$

65 - a) $F_x = -200 \text{ N}$
 $F_y = 0$

b) $F_x = 150 \text{ N}$
 $F_y = -100 \text{ N}$

73 - $v = \frac{v_0 r_0^2}{r^2}$

79 - a) $d = 35.774 \text{ km}$.


b) $v = 11.063 \text{ km/h}$

cap. 15 - Beer

05 - $\vec{v}_B = (-9,0 \text{ m/s}) \vec{j} + (15 \text{ m/s}) \vec{k}$
 $\vec{a}_B = (-1020 \text{ m/s}^2) \vec{i} + (-1125 \text{ m/s}^2) \vec{j} + (-675 \text{ m/s}^2) \vec{k}$

07 - $\vec{v}_D = (-0,6 \text{ m/s}) \vec{i} + (-0,53 \text{ m/s}) \vec{j} + (-0,71 \text{ m/s}) \vec{k}$
 $\vec{a}_D = (-4,43 \text{ m/s}^2) \vec{i} + (1,8 \text{ m/s}^2) \vec{j} + (2,4 \text{ m/s}^2) \vec{k}$

13 - a) $\omega = 2,5 \text{ rad/s}$ \curvearrowright
 $\alpha = 1,75 \text{ rad/s}^2$ \curvearrowright

b) $a_B = 1,17 \text{ m/s}^2$ 

15 - $a = \alpha \sqrt{1 + \alpha^2 t^4}$
 $t = 0,95 \text{ s}$

17 - $a_D = 6,86 \text{ m/s}^2$ \downarrow

31 - $\omega = 1,41 \text{ rad/s}$ \curvearrowright $v_A = 1,20 \text{ m/s}$ $\nearrow 25^\circ$

41 - $\omega_B = 9,95 \text{ rad/s}$ \curvearrowright

53 - $\omega_{AB} = 0,71 \text{ rad/s}$ \curvearrowright $v_A = 2,40 \text{ m/s}$ \rightarrow

57 - a) $\omega = 5 \text{ rad/s}$ \curvearrowright ; b) $v_A = 600 \text{ mm/s}$ \leftarrow ; c) $\Delta l = 450 \text{ mm}$

59 - $\omega_{AD} = 3,2 \text{ rad/s}$ \curvearrowright ; $v_D = 831,38 \text{ mm/s}$ \downarrow ; $v_A = 973,24 \text{ mm/s}$ $\nearrow 55,3^\circ$

67 - a) $v_F = 0,728 \text{ m/s}$ $v_G = 0,57 \text{ m/s}$ $\searrow 25,17^\circ$

79 - $a_C = 1,25 \text{ m/s}^2$ \uparrow

89 - $\omega_{BD} = 0$ $a_D = 8,06 \text{ m/s}^2$ \leftarrow

93 - $\omega_{AB} = 0$ $\omega_{BC} = \frac{\omega_0}{3}$ \curvearrowright $\alpha_{BC} = 0$ $\alpha_{AB} = \frac{2}{3} \omega_0^2$ \curvearrowright

101 - $\vec{r}_C = \vec{r}_A + \frac{\vec{\omega} \times \vec{r}_A}{\omega^2}$; $\vec{a}_A = \frac{\alpha}{\omega} \vec{v}_A + \vec{\omega} \times \vec{v}_A$

103 - $\alpha = \left(\frac{v_B \sin \theta}{l} \right)^2 \frac{\sin \theta}{\cos^3 \theta}$

107 - $v_C = 2l \omega \sin \theta$ \downarrow ; $a_C = 2l (\alpha \sin \theta + \omega^2 \cos \theta)$ \downarrow

115 - $v_{F/AD} = 896,41 \text{ mm/s}$ \nearrow ; $\omega_B = 4,15 \text{ rad/s}$ \curvearrowright

117 - $\omega_B = 1,73 \text{ rad/s}$ \curvearrowright ; $\omega_A = 3,36 \text{ rad/s}$ \curvearrowright

125 - $a_H = 1.124,68 \text{ mm/s}^2$ $\nearrow 39,8^\circ$

127 - $v_D = 695,85 \text{ mm/s}$

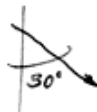
$a_D = 1.284,59 \text{ mm/s}^2$ $\nearrow 71,71^\circ$

cap. 16 - Beer

01- $a_G = 2,45 \text{ m/s}^2 \leftarrow$; $B_y = 45,69 \text{ N}$; $C_y = 25,51 \text{ N}$

03- $a_G = 3,33 \text{ m/s}^2 \rightarrow$; $B_y = 6,86 \text{ N}$; $A_y = 7,86 \text{ N}$

05- $a_A = 2,86 \text{ m/s}^2 \rightarrow$; $T = 30,66 \text{ N}$

21- a) $a_G = 8,50 \text{ m/s}^2$ ; b) $T_{CH} = 11,35 \text{ N}$
 $T_{BF} = 28,69 \text{ N}$

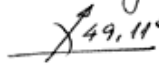
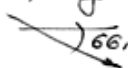
23- $B_y = 10,54 \text{ N} \downarrow$
 $C_y = 10,54 \text{ N} \downarrow$

45- $a = \frac{mg r^2}{(m_v k^2 + m r^2)}$

59- $\bar{a} = 2,4 \text{ m/s}^2 \rightarrow$; $\alpha = 16 \text{ rad/s}^2 \curvearrowright$; $d = 0,15 \text{ m}$

61- $\bar{a} = 1,95 \text{ m/s}^2 \uparrow$; $\alpha = 0,30 \text{ rad/s}^2 \curvearrowright$

63- $T_B = 1.649,48 \text{ N}$; $T_A = 1.068,02 \text{ N}$

71- $\alpha = \frac{3g}{L} \curvearrowright$; $a_A = 1,32 g \text{ m/s}^2$ ; $a_B = 2,18 g \text{ m/s}^2$ 

81- $\bar{x} = \frac{L}{6}$; $\alpha = \frac{6F}{mL} \curvearrowright$

85- $T = \frac{m\omega^2}{2} (l^2 - x^2)$



89- $M = 41,89 \text{ N m}$

91- a) $a_B = \frac{9}{7} g \uparrow$; b) $C_x = 0$ $C_y = \frac{4}{7} P \uparrow$

101- a) $a_c = 1,8g \downarrow$; b) $B = 0,2 mg \uparrow$

107- $\bar{a} = \frac{r^2}{k^2 + r^2} g \sin \beta$

115- A roda não desliza.
 $\alpha = 14,4 \text{ rad/s}^2 \curvearrowright$; $a_G = 2,30 \text{ m/s}^2 \rightarrow$

131- $\alpha = 6,18 \text{ rad/s}^2$; $A = 5,55 \text{ N}$ ; $B = 23,48 \text{ N}$ 

109- $\Delta x = 1,11 \text{ m}$