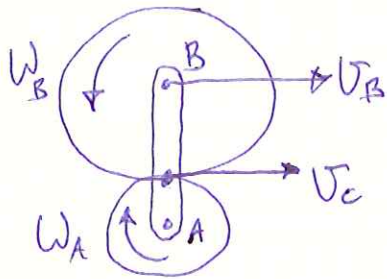


PROB. 15-50



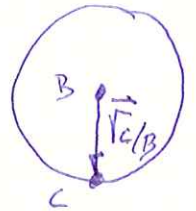
$$\omega_A = (120 \frac{\text{REV}}{\text{MIN}}) \left(\frac{\text{MIN}}{60 \text{ S}} \right) \left(\frac{2\pi}{\text{REV}} \right) = 12.57 \frac{\text{RAD}}{\text{SEC}} \text{ C.W.}$$

$$\omega_{AB} = (90 \text{ RPM}) \left(\frac{2\pi}{60} \right) = 9.425 \frac{\text{RAD}}{\text{SEC}} \text{ C.W.}$$

FIND ω_B

$$v_B = r_{AB} \cdot \omega_{AB} \quad , \quad v_C = r_A \omega_A$$

GEAR B: $\vec{v}_C = \vec{v}_B + \vec{v}_{C/B} = \vec{v}_B + \omega_B \hat{k} \times \vec{r}_{C/B}$



$$(\omega_B) \hat{k} \times (-r_B) \hat{j} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 0 & 0 & \omega_B \\ 0 & -r_B & 0 \end{vmatrix}$$

$$= [0 - (\omega_B)(-r_B)] \hat{i} = (r_B \omega_B) \hat{i}$$

$$r_A \omega_A = r_{AB} \omega_{AB} + r_B \omega_B$$

$$\omega_B = \frac{(r_A \omega_A - r_{AB} \omega_{AB})}{r_B}$$

$$= \frac{(60 \text{ mm}) \left(12.57 \frac{\text{RAD}}{\text{SEC}} \right) - (60 + 90) (9.425)}{(90 \text{ mm})}$$

$$\omega_B = \left(-7.328 \frac{\text{RAD}}{\text{SEC}} \right) \left(\frac{60}{2\pi} \right) = \boxed{-69.98 \text{ RPM} \curvearrowright}$$