Consider the following three objects all thrown with $\omega_3 = 40$ rad/s but with a small off-axis spin such that $\theta = 10°$

A. A Frisbee of mass $M = 175$ g and radius $R = 13.7$ cm (we ignore the height which is about 3.4 cm)

B. A wooden dowel with $M = 38$ g, radius $R = .94$ cm and length $\ell = 23$ cm

C. A thin-walled cylinder with $M = 16$ g, radius $R = 2.4$ cm and length $\ell = 8$ cm

For a disk:
$$I_A = \frac{1}{4}MR^2 \begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{pmatrix}$$

for a solid cylinder:
$$I_B = \frac{1}{12}M \begin{pmatrix} 3R^2 + \ell^2 & 0 & 0 \\ 0 & 3R^2 + \ell^2 & 0 \\ 0 & 0 & 6R^2 \end{pmatrix}$$

for a thin-walled cylinder:
$$I_C = \frac{1}{12}M \begin{pmatrix} 6R^2 + \ell^2 & 0 & 0 \\ 0 & 6R^2 + \ell^2 & 0 \\ 0 & 0 & 12R^2 \end{pmatrix}$$

For each object report the wobble frequency in the body frame (and the direction of $\boldsymbol{\omega}_\perp$ motion: same as or reverse from ω_3) and the wobble frequency in the inertial frame.