

$$\begin{aligned}
 \text{Input impedance on no-load, } Z_{n1} &= R_s + R_o/2 + R'_r/4 \\
 &\quad + j(X_s + X_o/2 + X'_r/2) \\
 &= 230 \angle 0^\circ / 0.535 \angle -\cos^{-1} 0.174 \\
 &= 75 + j 423 \text{ ohms}
 \end{aligned}$$

Therefore

$$R_o/2 = 75 - R_s - R'_r = 75 - 3 = 60 \text{ ohms}$$

$$X_o/2 = 423 - X_s - X'_r = 423 - 16 - 8 = 399 \text{ ohms}$$

$$\begin{aligned}
 \text{Rotational losses} &= P_{n1} - I_{n1}^2 (R_s + R'_r/4) \\
 &= (230) (0.535) (0.174) - (0.535)^2 (12 + 3)
 \end{aligned}$$

$$= 21.41 - 4.29$$

$$= 17.12 \text{ W}$$