

$$\omega = 6 \text{ rev/s} = 6(2\pi) \text{ rad/s} = 12\pi \text{ rad/s}$$

$$I = 1.12 \text{ Kg}\cdot\text{m}^2$$

Q1

$$KE = \frac{1}{2} I \omega^2 = \frac{1}{2} (1.12) (144 \pi^2) = 253.34 \text{ J}$$

$$\begin{aligned} \sum \tau &= F_1 r_1 \sin \theta_1 + F_2 r_2 \sin \theta_2 \\ &= 5(0.3) \sin 90 + 7(0.3) \sin 90 \\ &= 1.5 + 2.1 = 3.6 \text{ N}\cdot\text{m} \end{aligned}$$

Q2

$$\begin{aligned} \sum \tau &= I \alpha \\ 3.6 &= 0.2 \alpha \\ \alpha &= 18 \text{ rad/s}^2 \\ \omega_f &= \omega_i + \alpha \Delta t \\ &= 0 + 18(2) \\ &= 36 \text{ rad/s} \end{aligned}$$

$$\begin{aligned} KE &= \frac{1}{2} I \omega^2 \\ &= \frac{1}{2} (0.2) (36)^2 \\ &= 129.6 \text{ J} \end{aligned}$$

$$\begin{aligned} \omega_i &= 0 & \Delta t &= 15 \text{ s} & I &= 1.6 \times 10^{-3} \text{ Kg}\cdot\text{m}^2 \\ \omega_f &= 1200 \text{ rev/min} = \frac{1200(2\pi)}{60} = 40\pi \text{ rad/s} \end{aligned}$$

Q3

$$\alpha = \frac{\Delta \omega}{\Delta t} = \frac{40\pi - 0}{15} = 8.38 \text{ rad/s}^2$$

$$\sum \tau = I \alpha = 1.6 \times 10^{-3} \times 8.38 = 13.4 \times 10^{-3} \text{ N}\cdot\text{m}$$

عند لقفز يقوم بفتح قدميه . فيقبل عزم العصور لذائي وكزاد
السرعة الزاوية . وعندما يقوم بفرده جسمه يزاد عزم العصور (الذائي)
وتقل سرعته الزاوية .

Q4

$$I_i = \frac{2}{5} m r^2$$

Q5

$$r_p = \frac{1}{2} r_i = \frac{1}{2} r \Rightarrow I_p = \frac{2}{5} m \left(\frac{1}{2} r\right)^2 = \frac{1}{10} m r^2$$

$$\begin{aligned} I_i \omega_i &= I_p \omega_p \\ \frac{2}{5} m r^2 \omega_i &= \frac{1}{10} m r^2 \omega_p \Rightarrow \omega_p = 4 \omega_i \end{aligned}$$

$$* \omega = 100 \text{ rev} / 20 \text{ s} = \frac{100(2\pi)}{20} = 10\pi \text{ rad/s} \quad Q_6$$

$$* L = I\omega = (7)(10\pi) = 70\pi \text{ Kg}\cdot\text{m}^2/\text{s}$$

$$\omega_i = 2.4 \text{ rad/s} \quad Q_7$$

$$I_i = mr^2 = m(0.8)^2 = 0.64m \text{ Kg}\cdot\text{m}^2$$

$$\omega_p = ??$$

$$I_p = mr^2 = m(0.48)^2 = 0.23m \text{ Kg}\cdot\text{m}^2$$

$$I_i \omega_i = I_p \omega_p$$

$$m(0.64)(2.4) = m(0.23)\omega_p$$

$$\omega_p = 6.68 \text{ rad/s}$$

$$\omega_i = 1.9 \text{ rev/s} = 1.9(2\pi) = 3.8\pi \text{ rad/s} \quad Q_8$$

$$I_i \omega_i = I_p \omega_p$$

$$(1.33)(3.8\pi) = (0.48)\omega_p$$

$$\omega_p = 10.5\pi \text{ rad/s}$$

$$m = 3 \times 10^3 \text{ Kg}$$

$$v = 8 \times 10^3 \text{ m/s} \quad Q_9$$

$$r = 7 \times 10^6 \text{ m}$$

$$* \omega = \frac{v}{r} = \frac{8 \times 10^3}{7 \times 10^6} = 1.14 \times 10^{-3} \text{ rad/s}$$

$$* I = mr^2 = 3 \times 10^3 (7 \times 10^6)^2 = 147 \times 10^{15} \text{ Kg}\cdot\text{m}^2$$

$$L = I\omega = 1.47 \times 10^{17} \times 1.14 \times 10^{-3} \\ = 1.68 \times 10^{14} \text{ Kg}\cdot\text{m}^2/\text{s}$$