

23.

Given:

$$n=5, \text{ d } \cancel{= 600 \text{ mm}} \quad d_1 = 600 \text{ mm} \text{ or } r_1 = 300 \text{ mm}$$

$$d_2 = 300 \text{ mm} \text{ or } r_2 = 150 \text{ mm}, W = 100 \text{ kN} = 100 \times 10^3 \text{ N};$$

$$\mu = 0.12, \omega = 2\pi \times 90/60 = 9.426 \text{ rad/s}$$

We know that total frictional torque transmitted.

$$T = \frac{2}{3} \times \mu \cdot W \left[\frac{(r_1)^3 - (r_2)^3}{(r_1)^2 - (r_2)^2} \right]$$

$$= \frac{2}{3} \times 0.12 \times 100 \times 10^3 \left[\frac{(300)^3 - (150)^3}{(300)^2 - (150)^2} \right]$$

$$= 2800 \times 10^3 \text{ N-mm}$$

$$= 2800 \text{ N-m}$$

\therefore Power absorbed in friction

$$P = T \cdot \omega = 2800 \times 9.426 = 26400 \text{ W}$$

$$= 26.4 \text{ kW}$$

S. A. K.