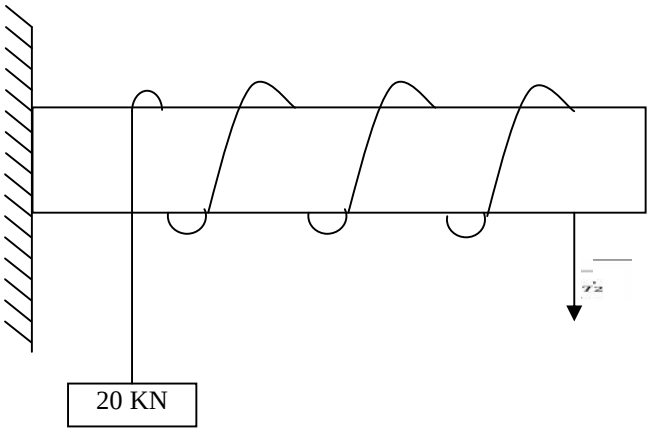
Problem 14:

A rope is wrapped three times around a rod as shown in Figure. Determine the force required on the free end of the rope, to support a load of 20 kN weight .The co-efficient of friction between the rope and the rod is 0.30



Solution:

$$T_1 = 20 \text{ kN}$$

$$T_2 = ?$$

$$\text{Angle of contact} = (360 \times 3) \times \frac{\pi}{180} = 6\pi \text{ radians}$$

$$\frac{T_1}{T_2} = e^{\mu\theta}$$

$$\frac{20}{T_2} = e^{(0.3 \times 6\pi)}$$

$$T_2 = 0.07 \text{ kN}$$

$$= 70 \text{ N}$$