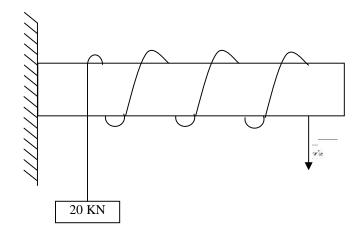
SNS COLLEGE OF ENGINEERING

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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:

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

$$T_2 = ?$$

Angle of contact = $(360 \times \frac{2}{3}) \times \frac{\pi}{180} = 6\pi$ radians

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

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

$$T_2=0.07\;\mathrm{kN}$$

$$= 70 \text{ N}$$