SNS COLLEGE OF ENGINEERING<br>Kurumbapalayam (Po), Coimbatore - 641107<br>Accredited by NAAC-UGC with 'A' Grade<br>Approved by AICTE \& Affiliated to Anna University, Chennai

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:

$$
\begin{gathered}
\mathrm{T}_{1}=20 \mathrm{kN} \\
\mathrm{~T}_{2}=? \\
\text { Angle of contact }=(360 \times 3) \times \frac{2}{180}=6 \pi \text { radians } \\
\frac{\mathrm{T}_{1}}{\mathrm{~T}_{2}}=\mathrm{e}^{\mu \theta} \\
\frac{20}{\mathrm{~T}_{2}}=\mathrm{e}^{(0.3 \times 6 \pi)} \\
\mathrm{T}_{2}=0.07 \mathrm{kN} \\
=70 \mathrm{~N}
\end{gathered}
$$

