16ME207- STRENGTH OF MATERIALS

UNIT II - TORSION AND SPRINGS

close-coiled helical springs

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close-coiled helical springs

A Closed Coiled Helical Springs: Designed to resist stretching and twisting, these springs are also known as tension/extension springs. These springs feature an eye or a hook at the end for attachment. These springs can endure stress caused by high torsion or bending

Formulae

HELICAL SPRINGS

i) Close-coiled.

ii) open-coiled.

Shear Stress τ :

From Torsion Equation.

$$\frac{T}{I_p} = \frac{C\theta}{l} = \frac{\tau}{r} ; \frac{T}{J_p} = \frac{\tau}{r}$$

(or)

$$T = \frac{\tau I_p}{r} = \frac{\tau \times \pi d^4}{32} \times \frac{2}{d} = \tau \times \frac{\pi}{16} \times d^3$$

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τ = Shear Stress.

l = length of Wire = $2\pi Rn$.

θ = Angle of Twist.

C = Modulus of Rigidity.

I_p = Polar Moment of Inertia = $\frac{\pi}{32} d^4$.

$$\tau = \frac{16T}{\pi d^3} \text{ (or) } \tau = \frac{16WR}{\pi d^3} \quad (\because T = WR)$$

Formulae

Deflection :- δ :-

Again, $\frac{T}{I_p} = \frac{C\theta}{l}$

$$\theta = \frac{Tl}{CI_p} = \frac{WR \times 2\pi Rn \times 32}{C \times \pi d^4} = \frac{64WR^2n}{Cd^4}$$

$$\delta = R \times \theta$$

$$\boxed{\delta = \frac{64WR^3n}{Cd^4}}$$