1. ⑤ A steel with yield strength of 50 kpsi is subjected to the plane stress state: $\sigma_x = -6$ kpsi, $\sigma_y = -14$ kpsi, $\tau_{xy} = -3$ kpsi. Compute the factor of safety n using (a) maximum-shear-stress theory, (b) distortion-energy theory.

2. ⑤ A bar is made of AISI 1006 cold-drawn steel and is loaded as shown, where $F = 1.1$ kN, $P = 16$ kN, and $T = 120$ N·m. Compute the factor of safety n for stress elements at A and B using the distortion-energy theory.

Dia. = 30 mm

---
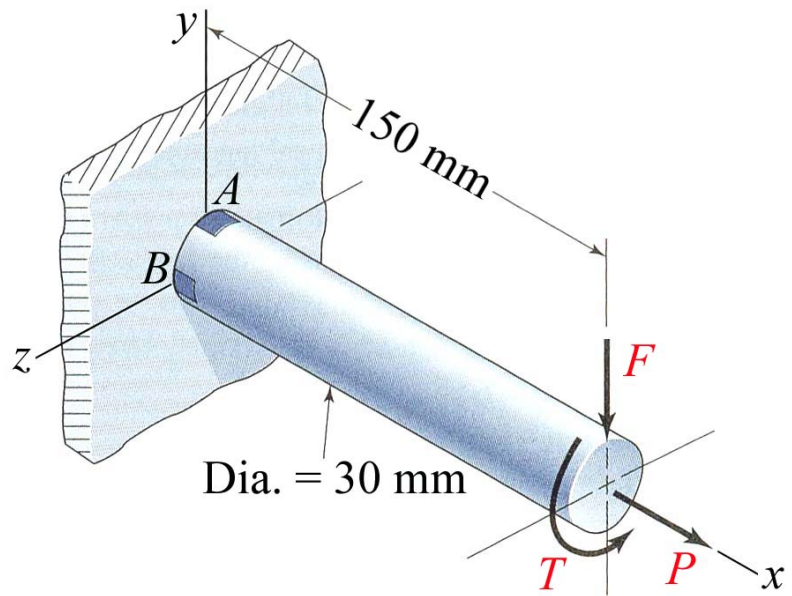
1. Units of *stresses*: kpsi $S_y = 50$

$R = 5$, $\sigma_1 = 0$, $\sigma_2 = -5$, $\sigma_3 = -15$, $2\tau_{max} = \sigma_1 - \sigma_3 = 15$ ①
(a) MSS: $n = S_y/(2\tau_{max})$ $n = 3.33$ ②
(b) DE: $\sigma' = 13.22876$ $n = S_y/\sigma'$ $n = 3.78$ ②

2. Units of *stresses*: MPa $S_y = 280$ ①

At A: $\sigma_x = 84.883$, $\tau_{xz} = 22.635$, $\sigma' = 93.499$ $n = 2.99$ ②
At B: $\sigma_x = 22.635$, $\tau_{xy} = -24.710$, $\sigma' = 48.416$ $n = 5.78$ ②