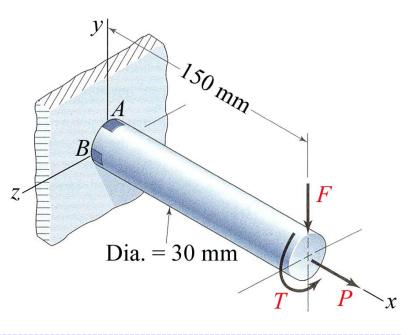**1.** ⑤ A steel with yield strength of 50 kpsi is subjected to the plane stress state: $\sigma_x = 6$ kpsi, $\sigma_y = 12$ kpsi, $\tau_{xy} = -4$ kpsi. Compute the factor of safety n using *(a)* maximum-shear-stress theory, *(b)* distortion-energy theory.

2. ⑤ A bar is made of AISI 1006 cold-drawn steel and is loaded as shown, where $F = 1.5$ kN, $P = 18$ kN, and $T = 150$ N·m. Compute the factor of safety n for stress elements at A and B using the distortion-energy theory.

Dia. = 30 mm

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

$R = 5, \ \sigma_1 = 14, \ \sigma_2 = 4, \ \sigma_3 = 0, \ 2\tau_{max} = \sigma_1 - \sigma_3 = 14$ ①

(a) MSS: $n = S_y/(2\tau_{max})$ $\qquad\qquad\qquad\qquad\qquad\qquad n = 3.57$ ②

(b) DE: $\sigma' = 13.22876$ $\qquad\qquad n = S_y/\sigma'$ $\qquad n = 4.00$ ②

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

At A: $\sigma_x = 110.3474, \ \tau_{xy} = 28.2942, \ \sigma' = 120.74 \quad n = 2.32$ ②

At B: $\sigma_x = 25.4648, \ \tau_{xy} = -31.1236, \ \sigma' = 59.62 \quad n = 4.70$ ②