1-48

GIVEN:

A COINING PRESS IS USED TO MAKE COINS.

FORCE REQ: 18,000 lbf PISTON DIAMETER: 2.50"

REQUIRED:

CALCULATE THE NECESSARY OIL PRESSURE TO PRODUCE REQUIRED FORCE

SOLUTION:

$$P = \frac{F}{A}$$

- P = OIL PRESSURE
- F = REQUIRED FORCE
- A = AREA OF PISTON

$$P = \frac{(18{,}000\,lbf)}{\frac{\pi}{4}(2.50")^2} = \boxed{3667\ psi}$$

1-58

GIVEN:

COMPUTE THE PRESSURE CHANGE REQUIRED TO REDUCE THE VOLUME OF Hg BY 1%

REQUIRED:

COMPUTE PRESSURE CHANGE, PROVIDE ANSWER IN PSI AND MPa

SOLUTION:

- BULK MODULUS PROBLEM, SO:

(1) $$E = \frac{-\Delta P}{\frac{\Delta V}{V}}$$

- E = BULK MODULUS OF Hg
- ΔP = PRESSURE CHANGE
- ΔV = VOLUME CHANGE
- V = INITIAL VOLUME

E_{Hg} = 3,590,000 Psi, 24,750 MPa ⟶ FROM TABLE 1.3

- FOR A 1% REDUCTION IN VOLUME:

$$\frac{\Delta V}{V} = -0.01$$

1-58 cont

- SOLVE (1) FOR ΔP:

$$\Delta P = -E\left(\frac{\Delta V}{V}\right)$$

- IN PSI:

$$\Delta P = -(3{,}550{,}000 \text{ psi})(-0.01) = \boxed{35{,}900 \text{ psi}}$$

- IN MPa:

$$\Delta P = -(24{,}750 \text{ MPa})(-0.01) = \boxed{247.5 \text{ MPa}}$$

2-17

GIVEN:

GIVE 4 EXAMPLES OF FLUIDS THAT ARE NON-NEWTONIAN

REQUIRED:

PROVIDE 4 EXAMPLES

SOLUTION:

1. PRINTER INK
2. FLOUR DOUGH
3. LIQUID POLYMERS
4. KETCHUP

2-18

GIVEN:

WATER @ 40°C

REQUIRED:

DETERMINE THE VISCOSITY OF H_2O @ 40°C USING TEXTBOOK TABLES

SOLUTION:

$$\eta = \boxed{6.5 \cdot 10^{-4} \text{ Pa} \cdot \text{s}}$$