

# FTI – Teste I

Felipe B. Pinto 61387 - MIEQB

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## Questão 2

$$1 \text{ W} = 1 \text{ kg m}^2 \text{ s}^{-3}$$

## Questão 3

$$3 \text{ Pa} = 3 \text{ kg m}^{-1} \text{ s}^{-2} = 3 * 10^{3-2} \text{ g cm}^{-1} \text{ s}^{-2} = 3 * 10 \text{ g cm}^{-1} \text{ s}^{-2}$$

## Questão 4

$$\begin{aligned} 8 \text{ J} &= 8 \text{ N m} = 8 \text{ kg m}^2 \text{ s}^{-2} = 8 \text{ kg m}^2 \text{ s}^{-2} \frac{\text{lb}}{0.4536 \text{ kg}} \left( \frac{\text{ft}}{0.3048 \text{ m}} \right)^2 = \\ &= 8 \text{ lb ft}^2 \text{ s}^{-2} \frac{1}{0.4536} \frac{1}{0.3048^2} \cong 189.84 \text{ lb ft}^2 \text{ s}^{-2} \end{aligned}$$

## Questão 5

$$= \text{M L}^{-1} \text{ T}^{-2} = [A]$$

## Questão 6

$$\begin{aligned} [V]^a &= (\text{L}^3)^a = [k] [m]^b [\Delta T]^{-6} [P]^n = (\text{M})^b (\text{T})^{-6} (\text{M L}^{-1} \text{T}^{-2})^n = \\ &= \text{M}^{b+n} \text{T}^{-6-2n} \text{L}^{-n} \implies \begin{cases} b+n=0 \implies b=3 \\ -6-2n=0 \implies n=-3 \\ -n=3a \implies a=1 \end{cases} \end{aligned}$$

## Questão 7

$$[\Delta P] = \text{ML}^{-1} \text{T}^{-2}$$

$$\begin{aligned} [D] &= \text{L} & [\omega] &= \text{ML}^2 \text{T}^{-2} \\ [\rho] &= \text{ML}^{-3} & [G_v] &= \text{L}^3 \text{T}^{-1} \end{aligned}$$

## Questão 8

$$[V] = \text{LT}^{-1}$$

$$[d] = \text{L} \quad [\mu] = \text{ML}^{-1} \text{T}^{-2} \quad [\gamma] = [\gamma_s] = \text{ML}^{-3}$$

## Questão 9

$$h = \frac{f L V^2}{2 D g}$$

$$[h] = \text{L} = \frac{[f] [L] [V]^2}{[2] [D] [g]} = \frac{[f] \text{L} (\text{LT}^{-1})^2}{(\text{L}) (\text{LT}^{-2})} = [f] \text{L}^1 \implies [f] = 1$$

## Questão 10

$$G_s = v S = 23 \pi (11 \text{ E} - 1)^2 = 23 \pi (11)^2 \text{ E} - 2 \cong 87.43$$

## Questão 11

$$\bar{v} = \frac{D^2}{32 \mu} \frac{-\Delta P}{L}$$

$$\bar{v} = \frac{D^2}{32 \mu} \frac{-\Delta P}{L} = \frac{(2 * 2.5 \text{ E } -5)^2}{32 * 0.003} \frac{1.3 \text{ E } 3}{1.1 \text{ E } -3} = \frac{(2 * 2.5)^2}{32 * 0.003} \frac{1.3}{1.1} \text{ E } -4 \cong 30.78 \text{ E } -3$$

## Questão 12

$$\bar{v} = \frac{D^2}{32 \mu} \frac{-\Delta P}{L}$$

$$\begin{aligned} \mu &= \frac{D^2}{32 \bar{v}} \frac{-\Delta P}{L} = \frac{(8 \text{ E } -2)^2}{32 (G_s/S)} \frac{8 \text{ E } 6}{50} = \frac{(8 \text{ E } -2)^2}{32 ((0.2/60)/(\pi * (8 \text{ E } -2/2)^2))} \frac{8 \text{ E } 6}{50} = \\ &= \frac{8^3}{32 * 50 \frac{(0.2/60)}{(\pi * (8/2)^2)}} \text{ E } -2 = \\ &\cong 48.25 \end{aligned}$$

## Questão 17

$$\int \tau \, dx = \int \mu \, dv \implies \mu = \tau \frac{\Delta x}{\Delta v} = 349 \frac{7 \text{ E } -2}{1} \text{ Pa} \cong 244.30 \text{ poise}$$

## Questão 18

$$v_x(y) = \left( -\frac{dP}{dx} \right) \frac{H^2}{8\mu} \left( 1 - \left( \frac{2y}{H} \right)^2 \right)$$

$$\begin{aligned} \tau &= \frac{\mu}{\Delta y} \Delta v = \frac{\mu}{H} - \left( \left( -\frac{dP}{dx} \right) \frac{H^2}{8\mu} \left( 1 - \left( \frac{2H}{H} \right)^2 \right) \right) = \\ &= - \left( 11520 \frac{3 \text{ E} - 1}{8} (1 - 4) \right) \end{aligned}$$