FT I – Teste I

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Conteúdo

Questão 2

$$1\,\mathrm{W} = 1\mathrm{kgm^2s^{-3}}$$

Questão 3

$$3\,\mathrm{Pa} = 3\,\mathrm{kgm^{-1}s^{-2}} = 3 * 10^{3-2}\,\mathrm{g\,cm^{-1}s^{-2}} = 3 * 10\,\mathrm{g\,cm^{-1}s^{-2}}$$

Questão 4

$$8\,\mathrm{J} = 8\,\mathrm{N\,m} = 8\,\mathrm{kg\,m^2\,s^{-2}} = 8\,\mathrm{kg\,m^2\,s^{-2}}\,\frac{\mathrm{lb}}{0.4536\,\mathrm{kg}}\left(\frac{\mathrm{ft}}{0.3048\,\mathrm{m}}\right)^2 =$$
$$= 8\,\mathrm{lb\,ft^2\,s^{-2}}\,\frac{1}{0.4536}\frac{1}{0.3048^2} \cong 189.84\,\mathrm{lb\,ft^2\,s^{-2}}$$

Questão 5

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

Questão 6

$$[V]^a = (\mathrm{L}^3)^a = [k]\,[m]^b\,[\Delta T]^{-6}\,[P]^n = (\mathrm{M})^b\,(\mathrm{T})^{-6}\,(\mathrm{M\,L^{-1}\,T^{-2}})^n =$$
$$= \mathrm{M}^{b+n}\,\mathrm{T}^{-6-2\,n}\,\mathrm{L}^{-n} \implies \left\{\begin{array}{c} b+n=0 \implies b=3 \\ -6-2\,n=0 \implies n=-3 \\ -n=3\,a \implies a=1 \end{array}\right\}$$

Questão 7

$$[\boldsymbol{\Delta P}] = \mathrm{M\,L^{-1}\,T^{-2}}$$

$$[\boldsymbol{D}] = \mathrm{L} \qquad [\boldsymbol{\omega}] = \mathrm{M\,L^{2}\,T^{-2}}$$
$$[\boldsymbol{\rho}] = \mathrm{M\,L^{-3}} \qquad [\boldsymbol{G_v}] = \mathrm{L^{3}\,T^{-1}}$$

Questão 8

$$[\boldsymbol{V}] = \mathrm{L\,T^{-1}}$$

$$[\boldsymbol{d}] = \mathrm{L} \qquad [\boldsymbol{\mu}] = \mathrm{M\,L^{-1}\,T^{-2}} \qquad [\boldsymbol{\gamma}] = [\boldsymbol{\gamma_s}] = \mathrm{M\,L^{-3}}$$

Questão 9

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

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

Questão 10

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

Questão 11

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

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

Questão 12

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

$$\mu = \frac{D^2}{32\,\bar{v}}\,\frac{-\Delta P}{L} = \frac{(8\ \mathrm{E}-2)^2}{32\,(G_s/S)}\,\frac{8\ \mathrm{E}\,6}{50} = \frac{(8\ \mathrm{E}-2)^2}{32\,((0.2/60)/(\pi * (8\ \mathrm{E}-2/2)^2))}\,\frac{8\ \mathrm{E}\,6}{50} =$$

$$= \frac{8^3}{32 * 50\,\frac{(0.2/60)}{(\pi * (8/2)^2)}}\ \mathrm{E}-2 =$$

$$\cong 48.25$$

Questão 17

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

Questão 18

$$\boldsymbol{v_x(y) = \left(-\frac{\mathrm{d}P}{\mathrm{d}x}\right) \frac{H^2}{8\,\mu} \left(1 - \left(\frac{2\,y}{H}\right)^2\right)}$$

$$\tau = \frac{\mu}{\Delta y}\,\Delta v = \frac{\mu}{H} - \left(\left(-\frac{\mathrm{d}P}{\mathrm{d}x}\right) \frac{H^2}{8\,\mu} \left(1 - \left(\frac{2\,H}{H}\right)^2\right)\right) =$$
$$= -\left(11520\,\frac{3\ \mathrm{E}-1}{8}\,(1-4)\right)$$