PADRÃO DE RESPOSTAS

(valor de cada questão = 2 pontos)

Questão	Resposta
1	A) $g_T = G\frac{M_T}{R_T^2}$ $g_h = G\frac{M_T}{(R_T + h)^2}$ $g_T \times R_T^2 = g_h \times (R_T + h)^2$ $10 \times (6,4 \times 10^6)^2 = g_h \times (6,4 \times 10^6 + 29,6 \times 10^6)^2$ $g_h = \frac{40,96 \times 10^{13}}{12,96 \times 10^{14}} = \mathbf{0,3\ m/s^2}$
	B) $v = \omega \times R$ $v = \frac{2\pi}{T} R$ $T = 1\,\text{dia} = 24\,\text{horas} = 86.400\,\text{segundos}$ $v = \frac{2 \times 3 \times (29.600.000 + 6.400.000)}{86.400} = \mathbf{2.500\ m/s}$
2	A) P = E $m \times g = \mu \times V_{desl.} \times g$ $1,5 \times 10^8 = 1,025 \times 10^3 \times V_{desl.}$ $V_{desl.} = \frac{1,5 \times 10^8}{1,025 \times 10^3} = \mathbf{1,46 \times 10^5\ m^3}$
	B) $v = v_0 + a \times t$ $v_0 = 30 \times 0,5 = 15\,m/s \Rightarrow 0 = 15 + a \times 300$ $\lvert a \rvert = 5 \times 10^{-2}\,m/s^2$ $F_R = 1,5 \times 10^8 \times 5 \times 10^{-2} = \mathbf{7,5 \times 10^6\ N}$
3	A) $\alpha = \frac{\Delta L}{L_0 \Delta\theta} = \frac{12 \times 10^{-4}}{10^2} = 12 \times 10^{-6}\ {}^oC^{-1} \Rightarrow \gamma = 3\alpha = 36 \times 10^{-6}\ {}^oC^{-1}$ $\Delta V = V_0 \gamma \Delta\theta = 1,4 \times 10^5 \times 3,6 \times 10^{-5} \times 5 = \mathbf{25,2\ m^3}$
	B) Mar Vermelho. A maior salinidade desse mar implica uma maior densidade da água, o que acarreta um maior empuxo E. Dessa forma, o volume submerso será menor.

4

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

$F = m \times g = 2{,}16 \times 10^5 \times 10 = 2{,}16 \times 10^6 N$

$A = 12 x (0{,}5)^2 = 12 x 0{,}25 = 3 m^2$

$P = \frac{2{,}16 \times 10^6}{3} = \mathbf{7{,}2 \times 10^5\ N/m^2}$

B) $\varphi_{uma espira} = BA = 1{,}5 \times 10^{-2} \times \pi \times 2^2 = 0{,}18 Wb$

$\varphi_{total} = 10^4 \times 0{,}18 = 1{,}8 \times 10^3 Wb$

$\Delta\varphi = 0 - \varphi_{total} = -\varphi_{total}$

$\varepsilon_m = -\frac{\Delta\varphi}{\Delta t} = -\frac{-1{,}8 \times 10^3}{5{,}0 \times 10^{-2}} = \mathbf{3{,}6 \times 10^4\ V}$

5

A) $Q_1 = m \times c \times \Delta\theta = 1{,}0 \times 10^5 \times 1{,}0 \times (100 - 25) = 75 \times 10^5 = 7{,}5 \times 10^6 cal$

$Q_2 = L \times m = 540 \times 1{,}0 \times 10^5 = 5{,}4 \times 10^7\ cal$

$Q_3 = m \times A$

$A = \frac{B + b}{2} \times h = \frac{0{,}75 + 0{,}45}{2} \times 200 = 120\ cal/g$

$Q_3 = 10^5 \times 1{,}2 \times 10^2 = 1{,}2 \times 10^7 cal$

$Q_T = Q_1 + Q_2 + Q_3 = 7{,}5 \times 10^6 + 5{,}4 \times 10^7\ cal + 1{,}2 \times 10^7 = \mathbf{7{,}4 \times 10^7\ cal}$

B) $\begin{cases} 1\ g \quad \_\_\_\_\_ 10.000 cal \\ 4.320\ g \quad \_\_\_\_\_ \quad x\ cal \end{cases}$

$x = 4{,}32 \times 10^7 cal$

$P_T = \frac{Q}{t} = \frac{4{,}32 \times 10^7}{3600} = 1{,}2 \times 10^4\ cal/s$

$\eta = \frac{P_U}{P_T}$

$0{,}7 = \frac{P_U}{1{,}2 \times 10^4} = \mathbf{8{,}4 \times 10^3\ cal/s}$

6

A) $f_n = \frac{n \times v}{2 \times L} = \frac{2 \times 340}{2 \times 7} = \mathbf{48{,}6\ Hz}$

B) $V_{rel} = V_{som} - V_{trans.} = 340 - 5 = 335 m/s$

$V_{med.} = \frac{\Delta S}{\Delta t} \Rightarrow \Delta t = \frac{9.045}{335} = \mathbf{27\ s}$

7	A) $P_T = U \times i$ $i = \frac{P_T}{U} = \frac{4.000 \times 60 + 600 \times 200}{120} = \frac{360.000}{120} =$ **3.000 A**
	B) $E = P \times t = 360 \times 12 \times 10 = 43.200\ kWh$ $\begin{cases} 1\ kWh \_\_\_\_\_ R\$0,40 \\ 43.200\ kWh \_\_\_\_\_ x \end{cases}$ $x =$ **R$ 17.280,00**
8	A) $\Delta U = 0$ (ciclo)
	B) $V_{amb} = 20 \times 50 \times 5 = 5.000\ m^3$ $d_{ar} = \frac{m_{ar}}{V_{amb}} \Rightarrow m_{ar} = 5.000 \times 1,25 = 6.250\ kg$ $\begin{cases} 18\ segundos \_\_\_\_\_ 25kg \\ t \_\_\_\_\_ 6.250kg \end{cases}$ $t = \frac{18 \times 6.250}{25} =$ **4.500 s**
9	A) $G = \frac{f_{ob}}{f_{oc}} \Rightarrow 10 = \frac{40}{f_{oc}} \Rightarrow f_{oc} = 4cm$ $V_{ob} = \frac{1}{f_{ob}} = \frac{1}{0,4} \Rightarrow V =$ **2,5 di** $V_{oc} = \frac{1}{f_{oc}} = \frac{1}{0,04} \Rightarrow V =$ **25 di**
	B) objetiva: imagem real; ocular: imagem virtual
10	A) $M_1 = F_1 \times 100 = -100 \times 10^4\ N.m$ $M_2 = F_2 \times 80 = 160 \times 10^4\ N.m$ $M_{total} = M_1 + M_2 =$ **$6,0 \times 10^5\ N.m$**
	B) $F_R = F_1 + F_2 = 3,0 \times 10^4\ N$ $I = F_R \times \Delta t = 3,0 \times 10^4 \times 60 =$ **$1,8 \times 10^6\ N.s$**