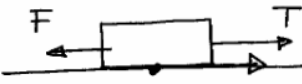
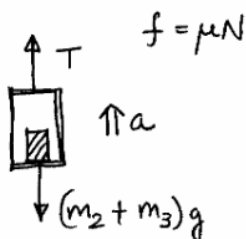


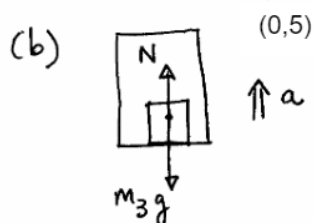
P1. (a)  $F - T - \mu m_1 g = m_1 a$ (0,5)



$$T - (m_2 + m_3)g = (m_2 + m_3)a$$
 (0,5)

$$\Rightarrow a = \boxed{1,5 \text{ m/s}^2}$$
 (0,5)

$$T = \boxed{1,265 \text{ N}}$$
 (0,5)



$$N - m_3 g = m_3 a \rightarrow N = \boxed{115 \text{ N}}$$
 (0,5)

Q1. $x = 2\pi \cos(10\pi t)$, $a = -20\pi^2 \sin(10\pi t)$

• $E_{c \max} = \frac{1}{2} m v_{\max}^2 = \boxed{9,87 \text{ J}}$ (0,25) $\rightarrow$ En el punt mitjà de l'oscil·lació. (0,25)

• $F_{\max} = m \cdot a_{\max} = \boxed{98,7 \text{ N}}$ (0,25) $\rightarrow$ En els extrems de l'oscil·lació. (0,25)

Q2. $E = k |q|/r^2$, $V = k q/r$ (0,5) $\rightarrow |q| = \frac{1}{k} \frac{V^2}{E} = \boxed{1 \times 10^{-10} \text{ C}}$ (0,25)

$\rightarrow q$ negativa (com V) (0,25)

OPCIÓ A / SÈRIE 3

P2. (a) $T = 1 \text{ dia} = 86.400 \text{ s}$ (0,25)

$$G M_T m / r^2 = m \omega^2 r \rightarrow r^3 = G M_T (T/2\pi)^2$$
 (0,5)

$$\rightarrow r = 4,23 \times 10^7 \text{ m} \rightarrow h = r - R_T = \boxed{3,59 \times 10^7 \text{ m}}$$
 (0,25)

(b) $U = -G \frac{M_T m}{r} = \boxed{-2,84 \times 10^9 \text{ J}}$ (0,5)

$$E = U + E_c = -\frac{1}{2} G \frac{M_T m}{r} = \frac{1}{2} U \rightarrow E = \boxed{-1,42 \times 10^9 \text{ J}} \quad (0,5)$$

$$(c) \quad E = E_c^* + U(R_T) \rightarrow E_c^* = E + G \frac{M_T m}{R_T} = \boxed{1,74 \times 10^{10} \text{ J}} \quad (0,5)$$

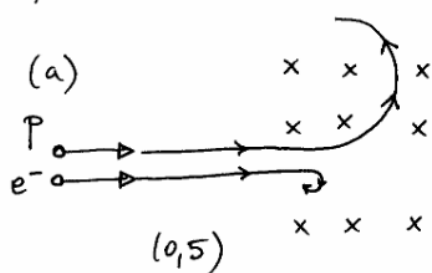
$$Q3. \quad \vec{T} \perp d\vec{r} \Rightarrow W_T = 0 \quad (0,5); \quad W_{mg} = -\Delta U = \boxed{mg \cdot 2L} \quad (0,5)$$

$$Q4. \quad \nu \text{ no canvia} \quad (0,25) \rightarrow E = h\nu \text{ no canvia} \quad (0,25)$$

$$\lambda \text{ es modifica} \quad (0,25) \rightarrow \lambda = \nu/\nu \text{ també es modifica} \quad (0,25).$$

OPció B / SÈRIE 3

P2.



$$q v B = m v^2 / r \rightarrow \boxed{m/r = \frac{qB}{v}} \quad (0,25)$$

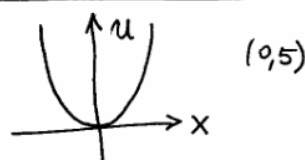
$$m_p \gg m_e \rightarrow r_p \gg r_e \quad (0,25)$$

$$(b) \quad |q_p| = |q_e| \rightarrow r_p/r_e = m_p/m_e = \boxed{1758} \quad (1,0)$$

$$(c) \quad \frac{m}{r} = \frac{qB}{v} \text{ amb } v = \omega r = \left(\frac{2\pi}{T}\right)r \rightarrow \frac{T_p}{T_e} = \frac{m_p}{m_e} = \boxed{1758} \quad (0,5)$$

$$Q3. \quad U = \frac{1}{2} k x^2 \rightarrow \text{paràbola amb les} \quad (0,5)$$

$$\text{branques cap amunt} \rightarrow$$



$$Q4. \quad \text{Circuit complet: } 6 = i R + \frac{i}{2} \cdot 20 \quad (0,25)$$

$$\text{Branca 1 bombeta: } 3 = \frac{i}{2} \cdot 20 \quad (0,25)$$

$$\left. \begin{array}{l} 6 = i R + \frac{i}{2} \cdot 20 \\ 3 = \frac{i}{2} \cdot 20 \end{array} \right\} \quad \begin{array}{l} i = 0,3 \text{ A} \\ \boxed{R = 10 \, \Omega} \end{array} \quad (0,5)$$