

Problema 8.1

a)	<p>Ecuția bilanțului termic $C(t-t_0) + mc(t-t_0) + mc(t-t_1) + mc(t-t_2) + mc(t-t_3) + mc(t-t_4) = 0$; (1.0 p.) de unde $(C+5mc)t = Ct_0 + mc(t_0 + t_1 + t_2 + t_3 + t_4)$ (0.5 p.) \Rightarrow $t = \frac{Ct_0 + mc(t_1 + t_2 + t_3 + t_4)}{C + 5mc}$ $= \frac{180 \frac{\text{J}}{^\circ\text{C}} \cdot 20^\circ\text{C} + 0,1\text{kg} \cdot 4200 \frac{\text{J}}{\text{kg} \cdot ^\circ\text{C}} \cdot 200^\circ\text{C}}{180 \frac{\text{J}}{^\circ\text{C}} + 5 \cdot 0,1\text{kg} \cdot 4200 \frac{\text{J}}{\text{kg} \cdot ^\circ\text{C}}} \approx 38,4^\circ\text{C}$ (0.5 p.)</p>	2.0 p.
b)	<p>Ecuția bilanțului termic după turnarea pe rând a lichidelor: După turnarea primului lichid: $mc(t_1 - \theta_1) = C(\theta_1 - t_0) + mc(\theta_1 - t_0)$ (1.0 p.) \Rightarrow $\Rightarrow \theta_1 = \frac{Ct_0 + mc(t_1 + t_0)}{C + 2mc} \approx 24,12^\circ\text{C}$ (0.5 p.) După turnarea lichidului al doilea $mc(t_2 - \theta_2) = C(\theta_2 - \theta_1) + 2mc(\theta_2 - \theta_1)$ (1.0 p.) \Rightarrow $\Rightarrow \theta_2 = \frac{C\theta_1 + mc(t_2 + 2\theta_1)}{C + 3mc} \approx 28,75^\circ\text{C}$ (0.5 p.) După turnarea lichidului al treilea $mc(t_3 - \theta_3) = C(\theta_3 - \theta_2) + 2mc(\theta_3 - \theta_2)$ (1.0 p.) \Rightarrow $\Rightarrow \theta_3 = \frac{C\theta_2 + mc(t_3 + 3\theta_2)}{C + 4mc} \approx 33,54^\circ\text{C}$ (0.5 p.) După turnarea lichidului al patrulea $mc(t_4 - \theta_4) = C(\theta_4 - \theta_3) + 4mc(\theta_4 - \theta_3)$ (1.0 p.) \Rightarrow $\Rightarrow \theta_4 = \frac{C\theta_3 + mc(t_4 + 4\theta_3)}{C + 5mc} \approx 38,42^\circ\text{C}$ (0.5 p.)</p>	6.0 p.
c)	<p>The left graph shows temperature t in $^\circ\text{C}$ on the y-axis (ranging from 10 to 60) and time τ in s on the x-axis. A horizontal purple line is drawn at $t = 38,42^\circ\text{C}$. Five diagonal lines, labeled t_0 (blue), t_1 (cyan), t_2 (green), t_3 (brown), and t_4 (red), all converge to the horizontal line at $\tau = \tau_0$. The right graph shows the same axes but with a sawtooth pattern. The horizontal segments are at $t = 38,42^\circ\text{C}$. The diagonal segments represent the cooling of each liquid, with the final temperature t_4 reaching $38,42^\circ\text{C}$ at time τ_4.</p>	2.0 p.
Total max		10.0 p.