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HW#1 ENGR 065

#3 b) Find the total energy delivered by the element.

$$\mathcal{E} = \int_0^\infty p(t)\,dt = \int_0^\infty 3/5\, e^{-500t}\,dt$$

$$= \frac{3}{5}\left(\frac{e^{-500t}}{-500}\right)_0^\infty = \frac{-3}{5(500)}\left(e^{-500(\infty)} - e^{-500(0)}\right)$$

$$= \frac{-3}{5(500)}(0-1)$$

$$\lim_{t\to\infty} e^{-500(\infty)} - \lim_{t\to 0} e^{-\infty} - 0$$

$$= \frac{-3}{5(500)}(-1) \Rightarrow \frac{3}{5(500)} = \frac{3}{2500} \Rightarrow \frac{3}{2.5\cdot 10^3}$$

$$\mathcal{E} = 1.2\cdot 10^{-3} J \Rightarrow \boxed{1.2\ mJ}$$

#4

Element	Voltage (V)	Current (mA)	D/A
a	-3	-250	Delivering
b	4	-400	Absorbing
c	1	400	Delivering
d	1	150	Absorbing
e	-4	200	Delivering
f	4	50	Absorbing

$$P_{delivering} = P_{Absorbing} \Rightarrow P_a + P_c + P_e = P_b + P_d + P_f$$

$$= (3\cdot 250\cdot 10^{-3}) + (1\cdot 400\cdot 10^{-3}) + (4\cdot 200\cdot 10^{-3}) = (4\cdot 400\cdot 10^{-3}) + (1\cdot 150\cdot 10^{-3}) + (4\cdot 50\cdot 10^{-3})$$

$$\boxed{1.95 = 1.95}$$

watts