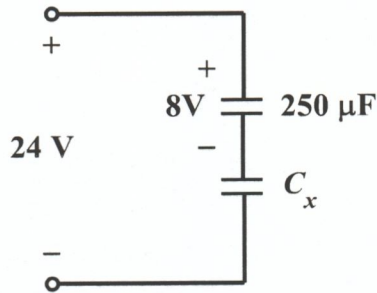EE 2240
Problem #02

Determine the capacitance of the unknown capacitor, C_x, and the amount of energy stored in it.

The capacitors are connected in series, so they must have had the same current flowing through them. This means they must hold the same charge:

$$Q = (250\mu F)(8V) = 2\,mC$$

From KVL, $\quad V_x = 24V - 8V = 16V.$

Then, $\quad C_x = \dfrac{Q}{V_x} = \dfrac{2\,mC}{16\,V} = 125\,\mu F$

and $\quad w = \tfrac{1}{2} C_x V_x^2 = \tfrac{1}{2}(125\times10^{-6})(16)^2 = 16\,mJ$