Sec: 8   **Quiz # 2   Ser. #**   **Name:**   **I.D.#**

For the circuit shown below, use nodal analysis to find

   a) **the voltage "v_o",**
   b) **the power of the dependent source (indicating weather it is absorbed or delivered)**
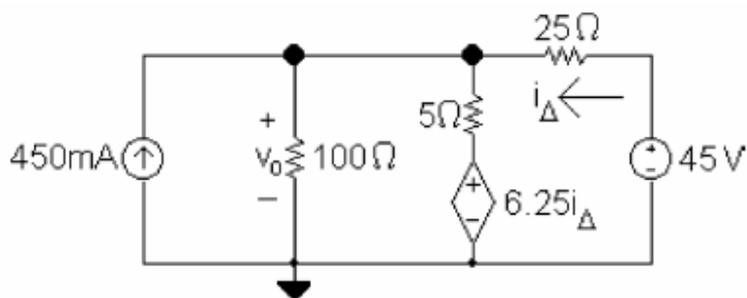
[a]

The node voltage equation is:

$$-0.45 + \frac{v_o}{100} + \frac{v_o - 6.25i_\Delta}{5} + \frac{v_o - 45}{25} = 0$$

The dependent source constraint equation is:

$$i_\Delta = \frac{45 - v_o}{25}$$

Place these equations in standard form:

$$v_o\left(\frac{1}{100} + \frac{1}{5} + \frac{1}{25}\right) + i_\Delta\left(-\frac{6.25}{5}\right) = \frac{45}{25} + 0.45$$

$$v_o\left(\frac{1}{25}\right) + i_\Delta(1) = \frac{45}{25}$$

Solving, $v_o = 15$ V; $i_\Delta = 1.2$ A

[b] $i_{ds} = \dfrac{v_o - 6.25i_\Delta}{5} = \dfrac{15 - 7.5}{5} = 1.5$ A

$p_{ds} = [6.25(1.2)](1.5) = 11.25$ W
Thus, the dependent source absorbs 11.25 W