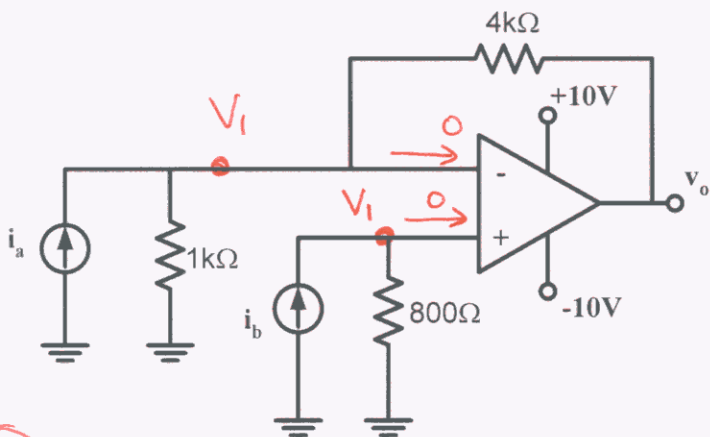


Quiz # 6  
EE201-06 (032)

Name KEY  
ID# \_\_\_\_\_

- (a) Find  $v_o$  in terms of  $i_a$  and  $i_b$ .  
(b) If  $i_a = 5A$ , what range of values of  $i_b$  will operate the amplifier in linear region.



(a)

$$V_1 = 800 i_b$$

Apply KCL at  $V_1$  node.

$$-i_a + \frac{V_1}{1K} + \frac{V_1 - V_o}{4K} = 0$$

$$\Rightarrow -4 \times 10^3 i_a + 4 V_1 + V_1 - V_o = 0$$

$$\Rightarrow V_o = (1 + 4)(800 i_b) - 4 \times 10^3 i_a$$

$$\Rightarrow V_o = 4 \times 10^3 i_b - 4 \times 10^3 i_a$$

$$\Rightarrow \boxed{V_o = 4 \times 10^3 (i_b - i_a)}$$

(b) For linear region.

$$-10 < v_o < +10$$

$$-10 < 4 \times 10^3 (i_b - 5) < +10$$

$$-10 < 4 \times 10^3 i_b - 20,000 < +10$$

$$\frac{-10 + 20,000}{4 \times 10^3} < i_b < \frac{10 + 20,000}{4 \times 10^3}$$

$$4.9975 < i_b < 5.0025$$