1. (*a*) The common-base and common-emitter current gains is given by

$$\alpha_0 = \gamma\alpha_T = 0.997 \times 0.998 = 0.995$$
$$\beta_0 = \frac{\alpha_0}{1-\alpha_0} = \frac{0.995}{1-0.995}$$
$$= 199 \ .$$

(*b*) Since $I_B = 0$ and $I_{Cp} = 10\times10^{-9}$ A , then I_{CBO} is 10×10^{-9} A . The emitter current is

$$I_{CEO} = (1+\beta_0)I_{CBO}$$
$$= (1+199)\cdot 10\times10^{-9}$$
$$= 2\times10^{-6} \text{ A} \ .$$

2. For an ideal transistor,

$$\alpha_0 = \gamma = 0.999$$
$$\beta_0 = \frac{\alpha_0}{1-\alpha_0} = 999 \ .$$

I_{CBO} is known and equals to 10×10^{-6} A . Therefore,

$$I_{CEO} = (1+\beta_0)I_{CBO}$$
$$= (1+999)\cdot 10\times10^{-6}$$
$$= 10 \text{ mA} \ .$$