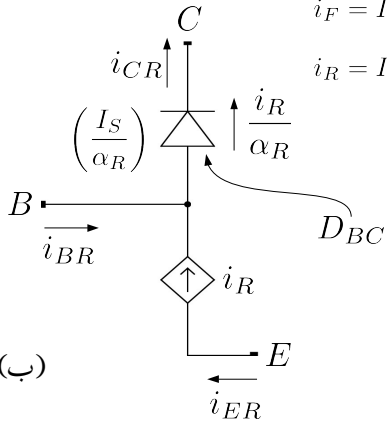
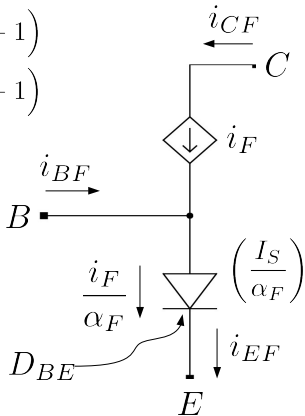


(ب)



$$i_F = I_S \left(e^{\frac{v_{BE}}{V_T}} - 1 \right)$$

$$i_R = I_S \left(e^{\frac{v_{BC}}{V_T}} - 1 \right)$$



(ا)