

1. Please draw the circuit symbols of
(1) Diode (2) *n*pn BJT (3) *n* channel E-MOS (24%)
2. Please draw the characteristic curves of
(1) Diode (2) Collector characteristic of BJT (16%)
3. What are the input and output resistances and the gain of the noninverting amplifier (Fig. 1)? Assume the op amp has $A_{ol} = 100,000$, $R_{in} = 2 \text{ M}\Omega$, and $R_{out} = 75 \Omega$. (20%)
4. Please find I_B , I_E , and I_C for the circuit shown in Fig. 2. ($\alpha_{DC} = 0.98$ and $\beta_{DC} = 49$) (20%)
5. Determine the voltages across each diode in Figs. 3 and 4, respectively. (20%)

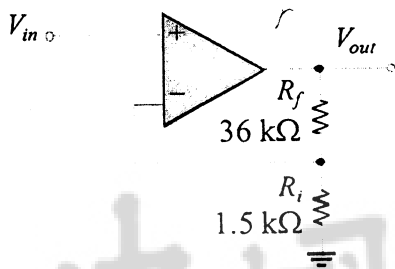


Fig. 1

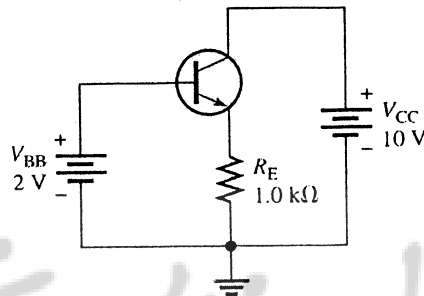


Fig. 2

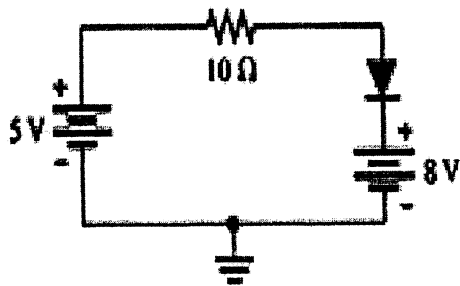


Fig. 3

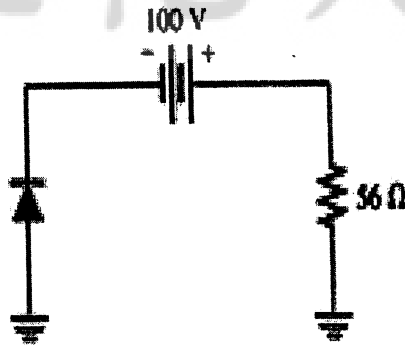


Fig. 4