

### Homework # 5

1. The circuit shown in Fig. 1 is a multi-functions TTL logic gate. Assume that a transistor works in saturation with  $V_{CE}=0.2V$  if it is ON. Find the logic function implemented by the circuit.

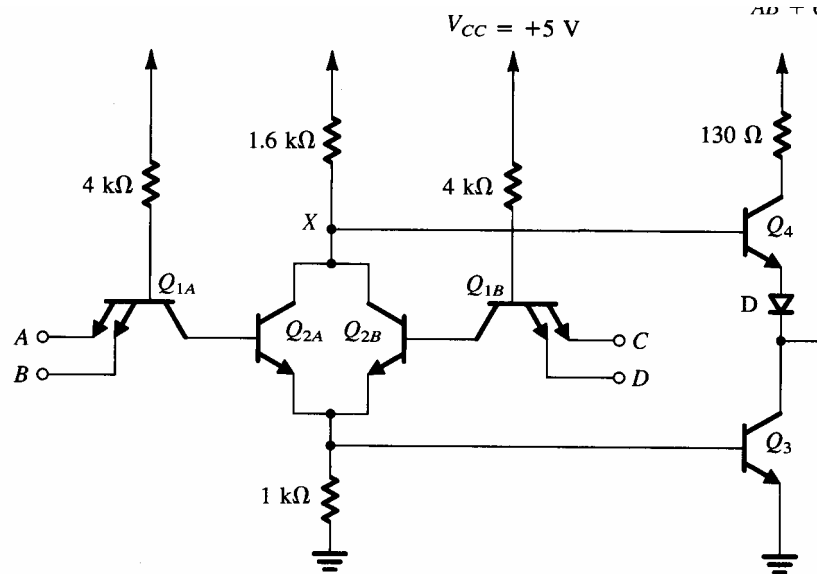
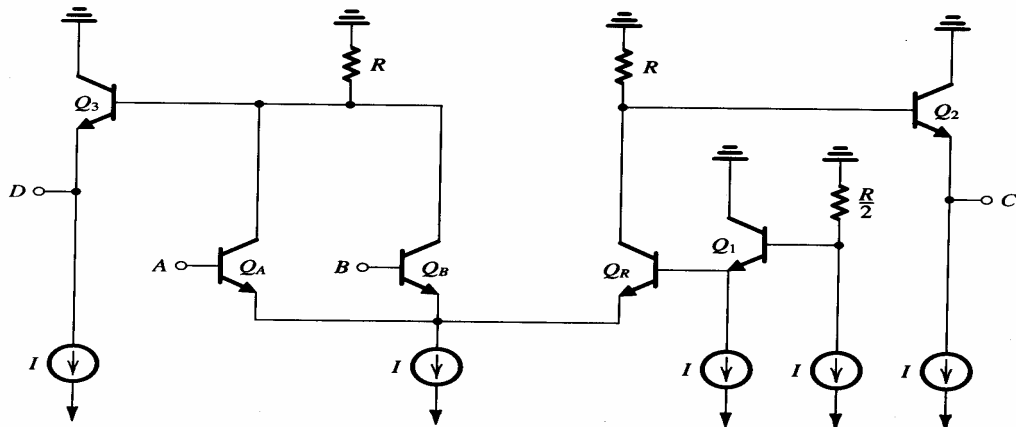


Fig. 1

2. The circuit of Fig. 2 is an ECL gate. Neglect the base currents

- Calculate  $V_{REF}$  in terms of  $I$  and  $R$ .
- What are  $V_{OH}$  and  $V_{OL}$ ?
- What are the logic gates implemented at  $D$  and  $C$ ?



3. Text book problems: Ch. 10: 25, 30, 36.