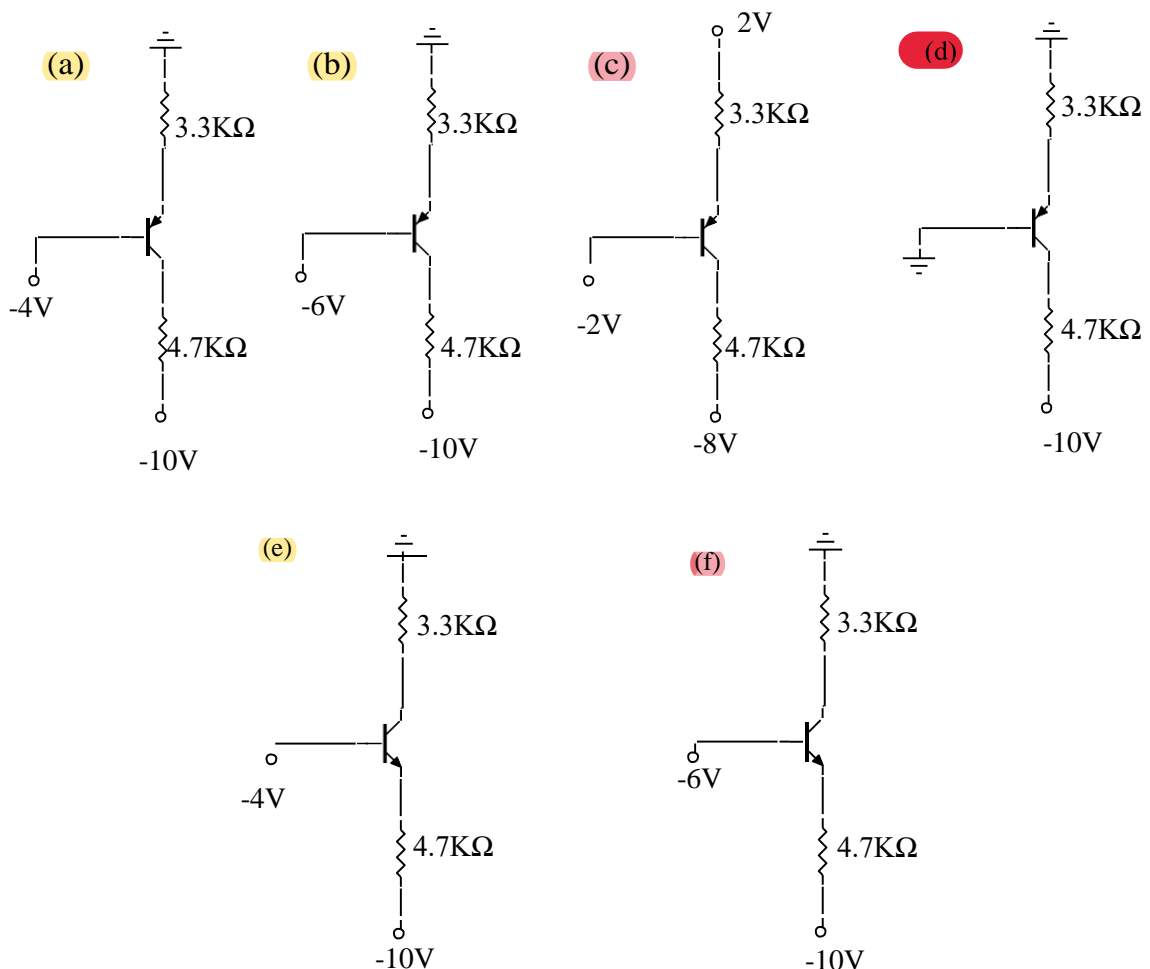


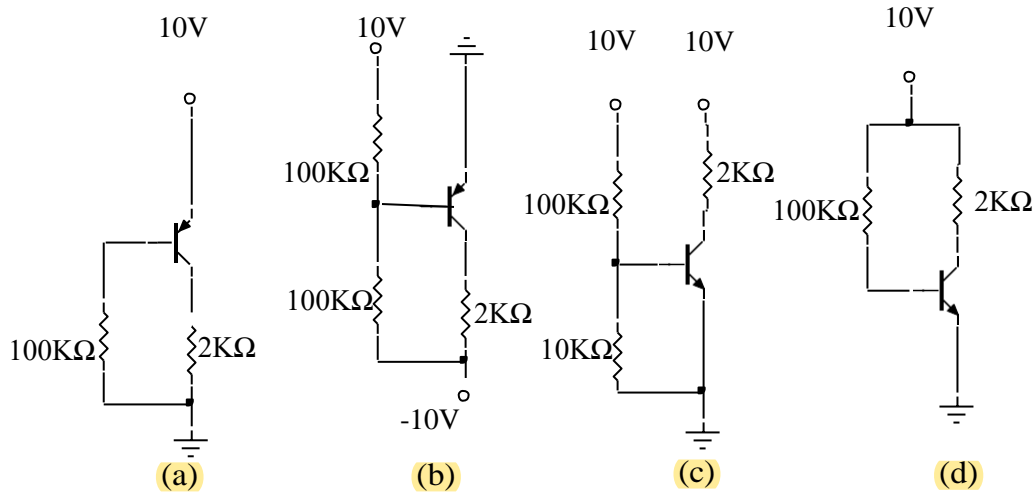
## Electronic Devices

### Sheet #5

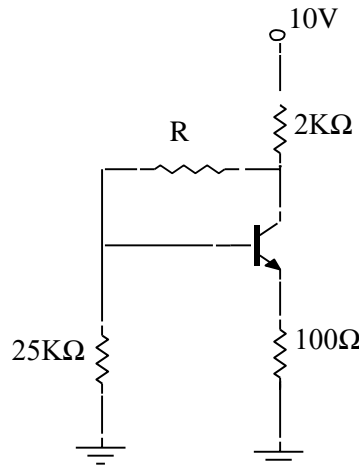
1. Consider NPN transistor whose base-emitter voltage is 0.76 V at a collector current equals 10 mA. Determine:
  - The current will it conduct at  $V_{BE} = 0.70$  V.
  - The base-emitter voltage for  $I_C = 10$   $\mu$ A.
2. In a BJT, the base current is 10  $\mu$ A, and the collector current is 600  $\mu$ A. Find  $\beta$  and  $\alpha$  for this transistor.
3. Measurement of npn BJT in a particular circuit shows the base current to be 14.46  $\mu$ A, the emitter current to be 1.460 mA, and the base-emitter voltage to be 0.7 V. For these conditions, calculate  $\alpha$  and  $\beta$ .
4. For the following circuits, find node voltages,  $V_E$ ,  $V_C$ , and currents  $I_E$ ,  $I_C$ ,  $I_B$ . Use  $V_{BE}$  (or  $V_{EB}$  for PNP transistor) = 0.7 V and  $\beta=50$ .



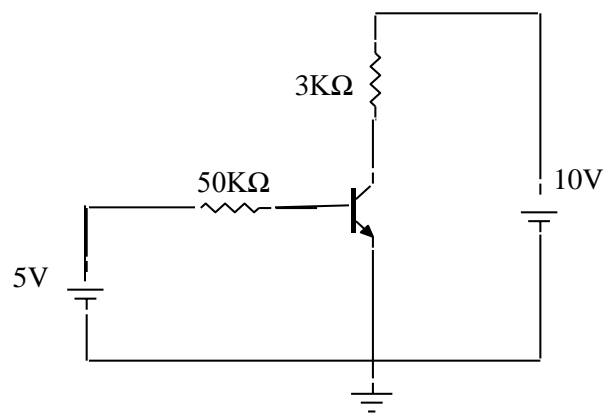
5. For the following circuits in which  $V_{BE}$  ( $V_{EB}$  for PNP transistor) = 0.7 V and  $\beta=10$ . Find the transistor's DC operating point?



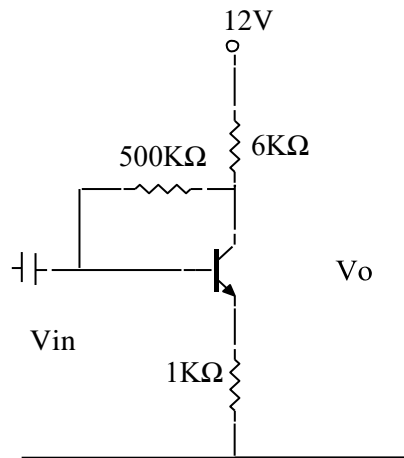
6. If  $\alpha=0.97$  and  $V_{BE} = 0.7V$ , find  $R$  in the circuit shown if  $I_E = 2mA$ .



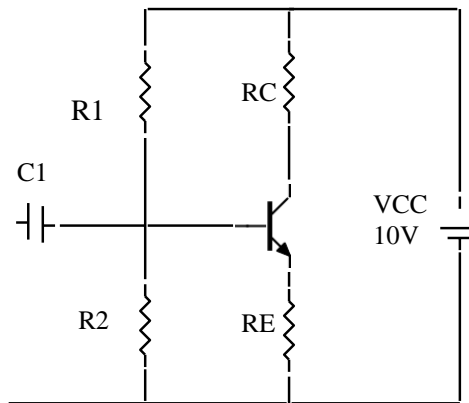
7. In the figure show below, if  $\beta=100$ , determine whether or not the silicon transistor is in saturation and find  $I_B$ , and  $I_C$ . Repeat with the 2KΩ emitter resistance is added.



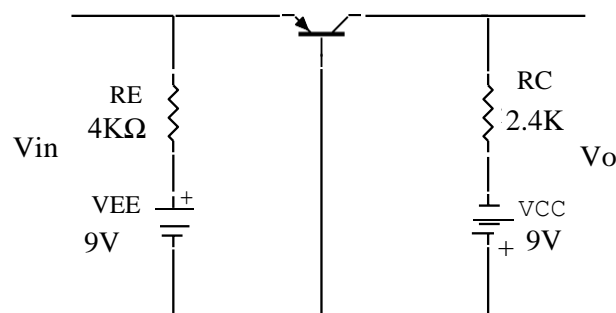
8. In the collector base bias circuit shown in figure, calculate the quiescent collector voltage when  $\beta=100$ .



9. In the circuit shown in figure, determine the unknown parameters that satisfy the bias condition to be  $V_{CE}=5V$  and  $I_C=1mA$  with  $\beta=50$ .

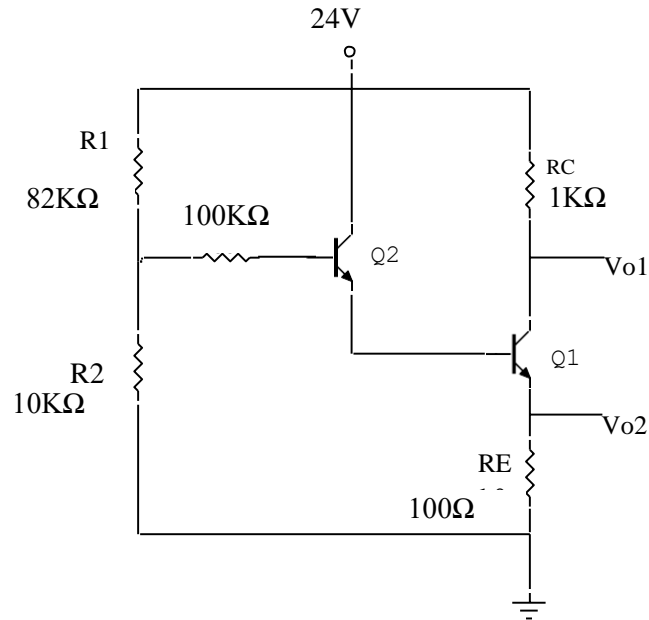


10. Calculate the currents  $I_E$  and  $I_C$  for the circuit shown in figure, if  $\beta=150$ .



11. For the circuit shown, transistor Q1 and Q2 operate in the active region with  $V_{BE1}=V_{BE2}=0.7V$ ,  $\beta_1=100$ ,  $\beta_2=50$ .

- Find the currents  $I_{B2}$ ,  $I_1$ ,  $I_2$ ,  $I_{C2}$ ,  $I_{B1}$ ,  $I_{C1}$ ,  $I_{E1}$ , and  $I_{E2}$ .
- Find the voltages  $V_{O1}$  and  $V_{O2}$ .



12. Evaluate the voltages at all nodes and the currents through all branches. What is the DC mode of operation for the transistors? Assume:  $V_{BE} = 0.7V$   $\beta=50$ .

