

EEE103/EEE121/EEE141 Problem Sheet

Diode Conduction State

- Q1** For the circuits of figure 1, identify the conduction state of the diode and calculate either the reverse bias voltage or the forward bias current, as appropriate. Assume that the diodes perfectly block current flow for all anode - cathode voltages less than 0.7V (the reverse bias state) and conduct perfectly if the circuit tries to make the anode - cathode voltage greater than 0.7V. *Note that the answers give the magnitude of the reverse bias voltage or forward current as appropriate. Since answers will let you avoid the guess stage, only some answers are given.*

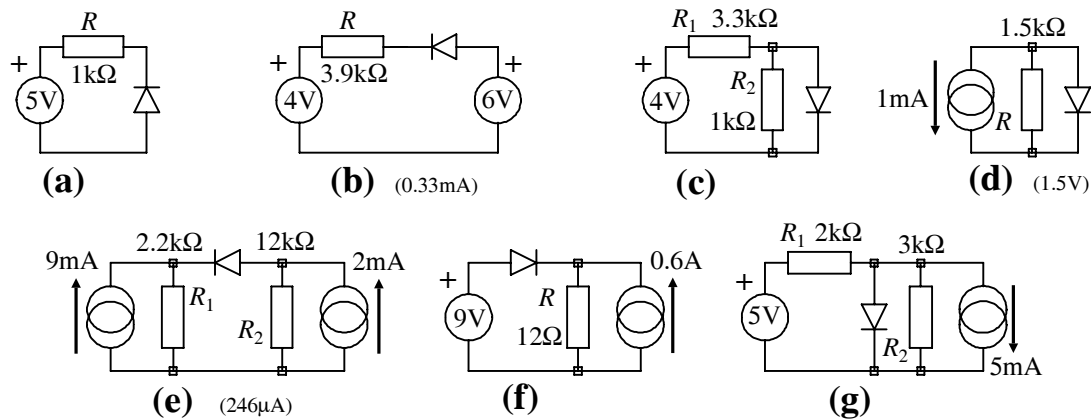


Figure 1

- Q2** The circuits of figure 2 are the same as figure 1 except that the source (or one of the sources) has been changed from a fixed value to a variable one. Find the value of the variable source at which the diode changes from a conducting to a non-conducting state.

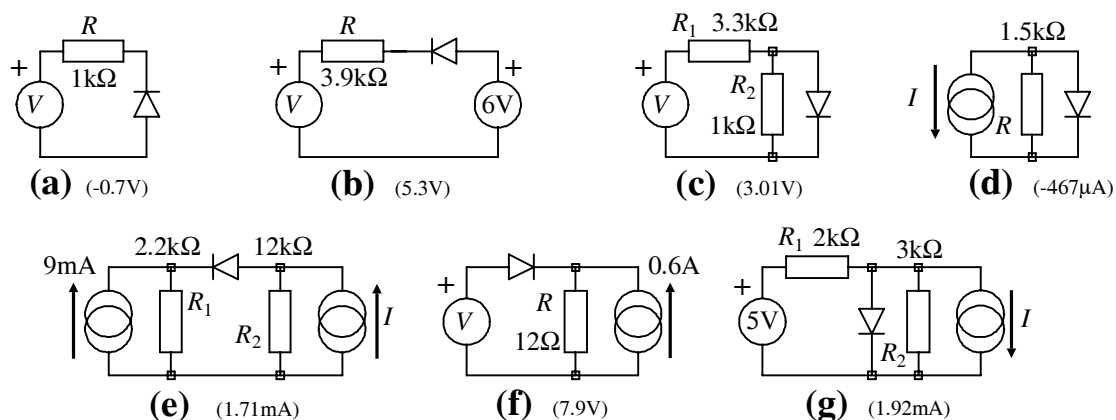


Figure 2

AND FOR EXPERTS

- Q3** The circuits in figure 3 are more complicated than those in figure 1. Identify the conduction state of the diode(s) and calculate either the reverse bias voltage or the forward bias current, as appropriate. Assume that the diodes perfectly block current flow for all anode - cathode voltages less than 0.7V (the reverse bias state) and conduct perfectly if the circuit tries to make the anode - cathode voltage greater than 0.7V. *Note: In circuits with two diodes there are in principle four possible combinations of conduction state. Start by making a guess for both diodes and proceed as for a single diode to find out whether your guesses were right.*

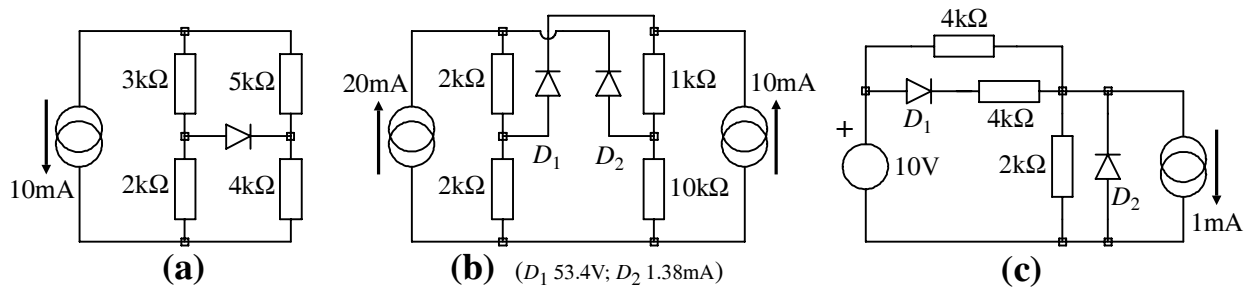


Figure 3

- Q4** The circuits of figure 4 are the same as figure 3 except that a source or component has been changed from a fixed value to a variable one. Find

- the value of R in figure 4a at which the diode is on the point of changing from a conducting to a non-conducting state.
- the value of I in figure 4b at which D_2 changes from a conducting to a non-conducting state. Has the state of D_1 changed under these new conditions?
- the value of I in figure 4c at which D_2 changes from a conducting to a non-conducting state. Has the state of D_1 changed under these new conditions?

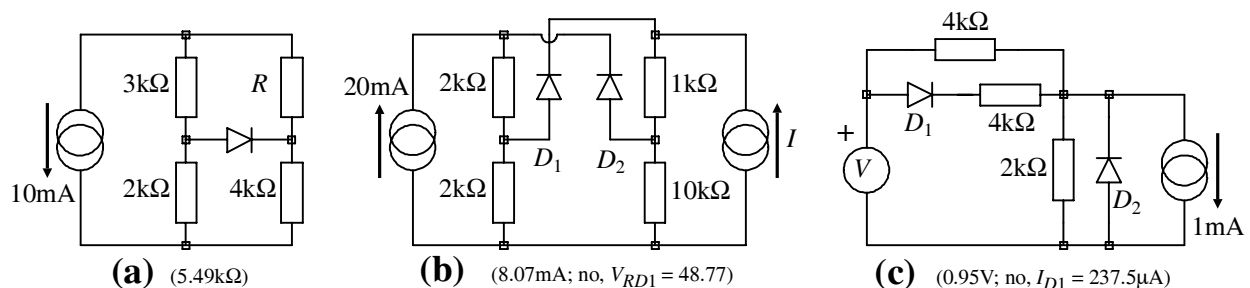


Figure 4