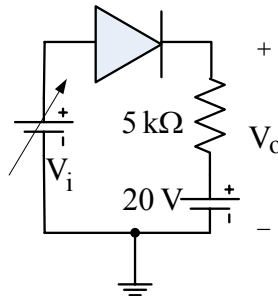
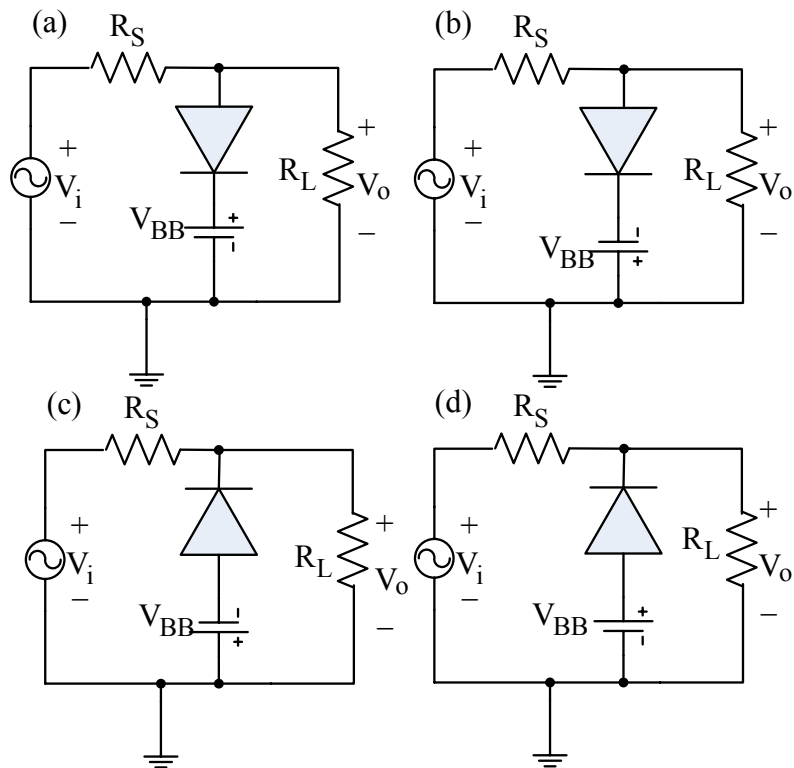


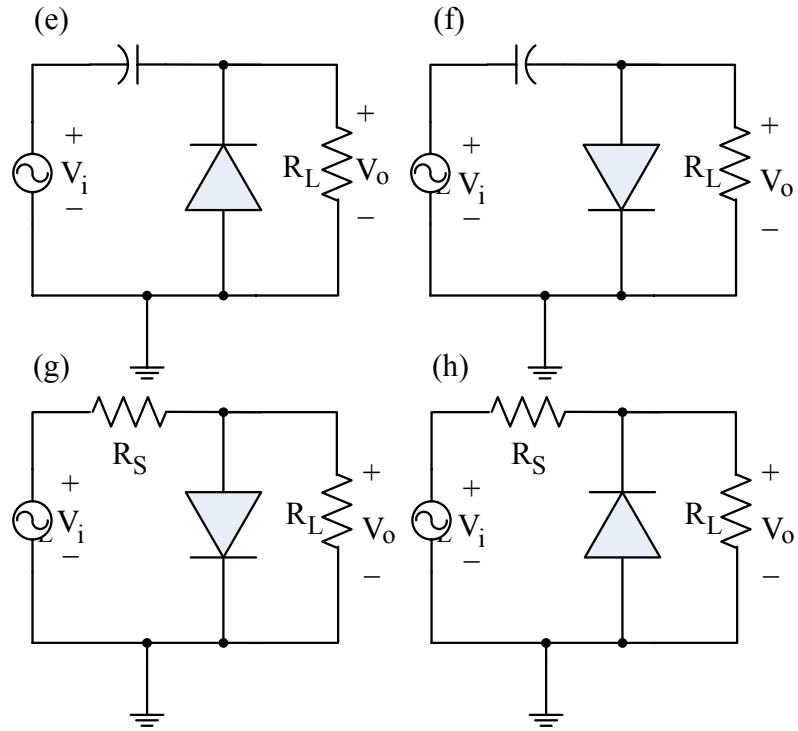
TUTORIAL 4

1. Draw the transfer characteristics (V_o vs V_i) for the following circuit. Draw the important properties and explain in detail the operation of this circuit. Assume that the diode is ideal, except for a forward resistance, R_f , of 20Ω .



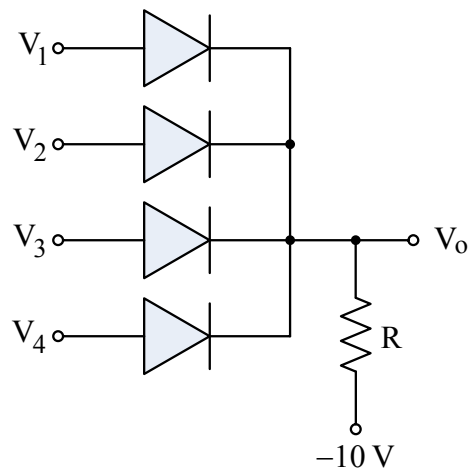
2. Draw the output waveform for one cycle of the input signal for the circuits below. The input is a sinusoidal waveform and has a peak voltage, V_p . Potential barrier for each diode is to be considered, but $|V_{BB}| \gg |V_{\text{potential-barrier}}|$.





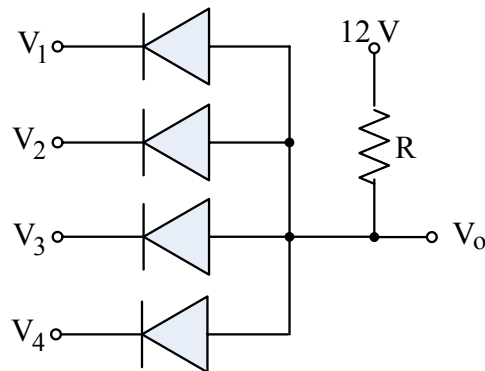
3. (a) Consider the following circuit. V_1 to V_4 are the inputs and V_o is the output of the circuit. Assume that the voltage drop across the diode is 0.6 V . Determine V_o when the input voltages are:

- (i) $V_1 = V_2 = V_3 = V_4 = 0\text{ V}$
- (ii) $V_1 = V_2 = 0, V_3 = V_4 = -4\text{ V}$
- (iii) $V_1 = V_2 = -5\text{ V}, V_3 = V_4 = -7\text{ V}$
- (iv) $V_1 = V_2 = V_3 = V_4 = -5\text{ V}$

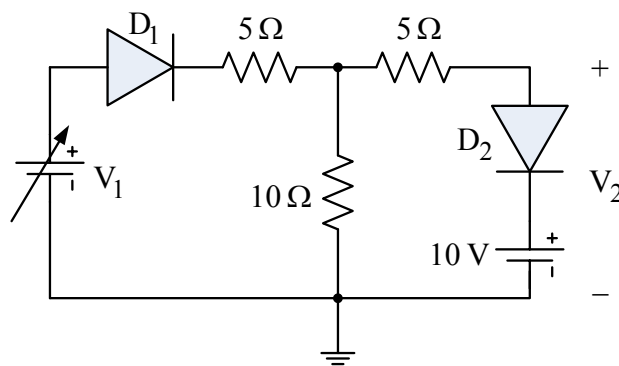


(b) Consider the following circuit. V_1 to V_4 are the inputs and V_o is the output of the circuit. Assume that the voltage drop across the diode is 0.6 V. Determine V_o when the input voltages are:

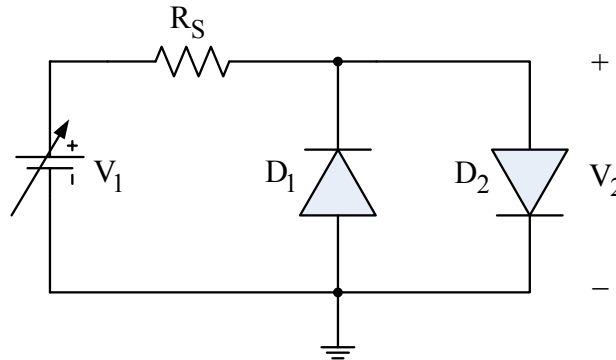
- (i) $V_1 = V_2 = V_3 = V_4 = 0$ V
- (ii) $V_1 = V_2 = 0, V_3 = V_4 = 3$ V
- (iii) $V_1 = V_2 = 2$ V, $V_3 = V_4 = 3$ V
- (iv) $V_1 = V_2 = V_3 = V_4 = 3$ V



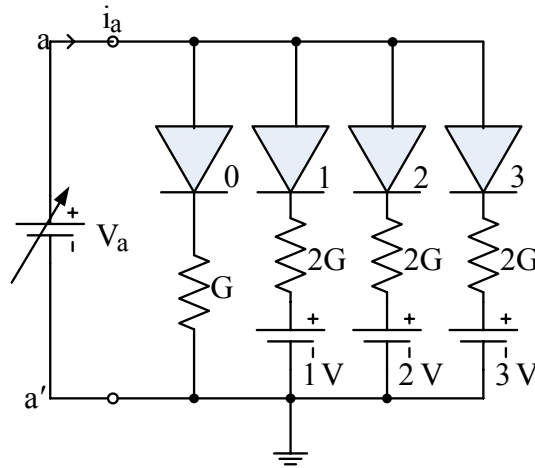
4. D_1 and D_2 in the circuit below are ideal diodes. Sketch the transfer characteristics for $-20 \leq V_1 \leq 20$ V.



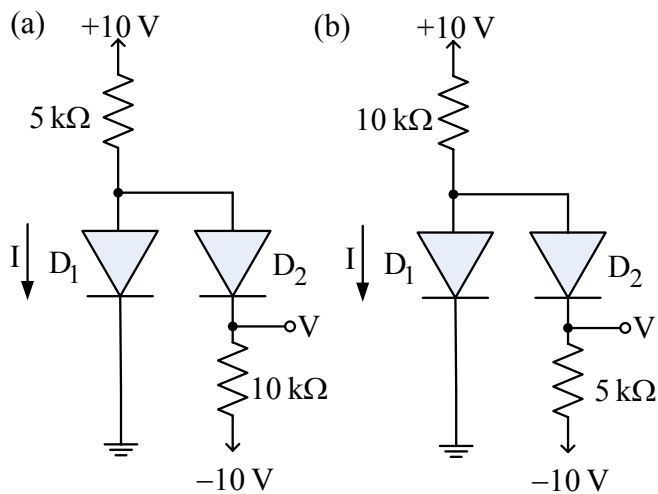
5. Draw the transfer characteristics (V_2 vs V_1) for the following diode circuit. The diodes are non-ideal (each has its own potential barrier and forward resistor).



6. Determine the relationship between i_a and V_a for the following circuit. Assume that each junction diode is modeled by the ideal piecewise linear diode.



7. If the diodes are assumed ideal, determine I and V for the circuits below:



8. Draw the V_{out} waveform referring to the amplitude and time of the V_{in} . Ensure that the important voltages are labeled on the diagram including the peak value of V_{out} . The forward voltage drop is 0.7 V. Forward resistance is neglected.

