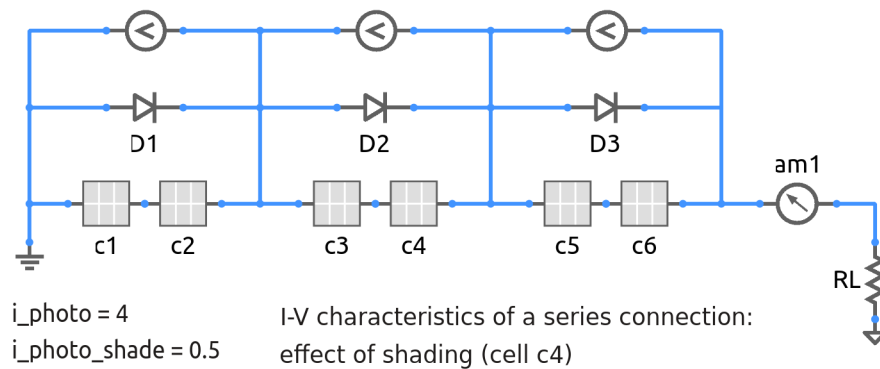


## solar\_iv\_5b.sqproj



In the circuit shown in the figure, six solar cells are connected in series. One bypass diode is connected for every two cells. One of the cells ( $C_4$ ) is under shade, and its photocurrent is reduced to  $I_{p4} = 0.5$  A. All other cells have a photocurrent of  $I_p = 4$  A.

### Exercise Set

1. Plot (on paper) the  $I$ - $V$  relationship for the array in two cases: (a) The above condition where  $I_{p4} = 0.5$  A and all other photocurrents are 4 A, (b) All photocurrents are equal (4 A).

Note: A critical examination of `solar_iv_5a.sqproj` will be helpful.

2. Plot the bypass diode currents ( $I_{D1}$ ,  $I_{D2}$ ,  $I_{D3}$ ) versus the total voltage drop with  $C_4$  under shade.
3. Plot the cell voltages ( $V_{C1}, \dots, V_{C6}$ ) versus the total voltage drop with  $C_4$  under shade.
4. Compare your plots with simulation results.

### References

1. L. Castaner and S. Silvestre, *Modelling Photovoltaic Systems with PSpice*, John Wiley and Sons, 2002.
2. C. S. Solanki, *Solar Photovoltaics: Fundamentals, Technologies, and Applications*, Prentice-Hall India, 2011.