Experiment 5

Temperature Depedence of Solar Cell

Read the lab handout given and the supporting document first before performing the pre-lab simulation exercises.

The aim of this simulation exercise is to do the following-

1. Write NGSPICE netlist to obtain the dark I-V and lighted I-V characteristics of solar cell (this was already done in previous task).

2. Plot I_d vs V_d for the solar call under 2 conditions by DC sweeping the supply voltage from -2 V to 2 V:

   (a) No light (0 current through LEDs)

   (b) Illumination (10 mA current through LEDs)

3. Perform the same at 5 different temperatures (35° C, 45° C, 55° C, 65° C and 75° C) and notice the trend.

4. Calculate fill factor for the illuminated condition at each of the 5 different temperatures and note down the observation.

Model file is same as the one used in experiment 4.

You can either sweep the temperature in NGSPICE itself or export I-V readings for each temperature and plot all 5 together on a different tool (like Python).
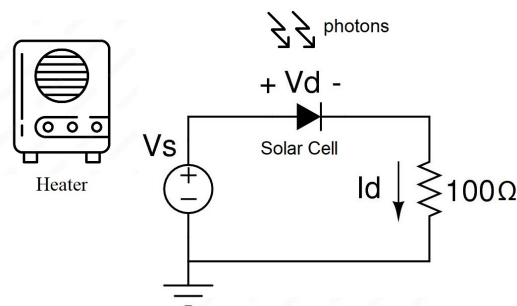You are required to submit the NGSPICE netlist, 2 plots (each consisting for 5 I-V characteristics) and fill factor values.

Figure 1: Solar Cell I-V circuit