A 4" dia Si Solar Cell shows their following performance at NOCT condition.

Calculate η .. $I_{sc} = 2.5\,A$ $V_{oc} = 590\,mV$ $FF = 0.68$

NOCT - Nominal Operating Cell temperature

Cell temp when irradiance is $800\,W/m^2$, ambient temp is 20°C & wind speed is 1m/s at a module tilt angle 15°

$$\eta = \frac{I_{sc} V_{oc}}{A \times P_{in}} \times FF \times 100\%$$

$$= \frac{2.5 \times 0.59}{\pi \times \frac{(4 \times 2.54)^2}{4} \times \frac{1}{100^2} \times 800} \times 0.68 \times 100$$

$$= \frac{2.5 \times 0.59 \times 0.68 \times 100}{\pi \times 4 \times 2.54^2 \times 8} \times 100$$

$$= \frac{100.3}{648.59} \times 100 = 15.46\%$$

$$A \rightarrow \frac{\pi D^2}{4}$$

$$= \pi \times \frac{(4 \times 2.54)^2}{4} \, cm^2$$

$$= \frac{4\pi \times 2.54^2}{100^2}$$

$P_{in} = 800\,W/m^2$ $\quad A \rightarrow \frac{\pi D^2}{4} \rightarrow \frac{\pi \times (4 \times 2.54)^2}{4} = 4\pi \times 2.54^2\,cm^2 = \frac{4\pi \times 2.54^2}{100^2}$

Note:- If given I_m is 90% of I_{sc} and V_m is 70% of V_{oc} then $FF = \frac{V_m I_m}{V_{oc} I_{sc}} = 0.9 \times 0.7 = 0.63$