## Worksheet 4 Questions – PV systems & issues

**1:** What are some of the risks associated with using & handling batteries?

**2:** Draw up a table which lists the electric shock risks associated with AC and DC currents. Compare the currents required to induce electric shock, some physical impacts, and the effect on the human heart. Which type of current is more dangerous? Why are there differences in the nature of their effects?

**3:** Transformers are commonly used in the electricity distribution network, to increase voltages and decrease the currents flowing in transmission lines. A transformer receives a $200A_{ac}$ current at an AC voltage of $240V_{ac}$. If the device increases this voltage to $2.4kV_{ac}$, what will be the new current flowing from the transformer (assuming power loss in the transformer is negligible)? What would be the current if the voltage were decreased to $12V_{ac}$? Can a transformer vary the voltage of a DC current?

**4:** If 300W of DC power is to be delivered to a plasma TV that is 3km down the road, calculate the power that needs to be generated by a supplying PV system under the following conditions:
Wire cross section = $0.0002m^2$,
Resistivity of the copper wire = $1.7\times10^{-8}\Omega m$
The PV supply voltage for the 300W is 12V

**5:** In 2 lines each, briefly describe what is involved in the following steps of the silicon PV cell manufacturing process:

(a) Purification of extracted silicon
(b) Casting of mono-crystalline silicon ingots
(c) Texturing
(d) Antireflective coating (ARC) deposition
(e) Metal contact application
(f) Quality control
- End of manufacture
- In-line

**6:** What is islanding, and how can such a situation be managed in grid-connected PV systems?

**7:** Describe 2 design requirements or concerns relating to the following types of PV system applications:

(a) Stand-alone power systems
(b) PV-Hybrid power systems

**8.** What is the role of a charge regulator?