Solution sheet model 6 – Solar energy

Topic task

1. a) Solar collectors generate warmth and heat
   b) Solar thermal power stations generate electrical power by converting heat into water vapour
   c) Solar cookers or solar ovens heat food
   d) Solar cells generate direct current
2. Photovoltaics: Solar cells generate direct current.

Experimental task 1

1. The optimal angle of incidence is 90 degrees to the light source.
2. From approx. 0.3 V and 200 mA (please check)

Experimental task 2

1. Parallel connection: The voltage (V) remains the same. The amount of electricity (A) increases.
2. The motor makes the indicator turn earlier with the modules connected in parallel, although the existing voltage (V) is unchanged. The motor can be loaded more.
3. The torque of the motor increases. The torque is current-dependent. The speed is voltage-dependent. Torque is required to start up and accelerate.

Experimental task 3

1. Series connection: The voltages (V) of the two solar modules change. The amount of electricity (A) remains the same.
2. The rotational speed of the indicator is faster with series connection, since the speed of the motor is voltage-dependent.
3. The run indicator stops with series connection, in contrast to parallel connection.
4. In very poor lighting circumstances. A parallel connection of the solar module still delivers current with the same voltage, even if the solar module is partially shadowed.

Experimental task 4

1. The rotational direction of the motor changes.
2. Pole reversing switch

Experimental task 5

A series connection is best suited for the solar vehicle because the motor is under a very heavy load, and therefore requires a high start-up voltage.

Experimental task 6

1. 2 Modules •1V=2V.
2. The connected solar modules discharge the Goldcap
3. If you connect the green LED from the building set in parallel. When it begins to light up, the Goldcap has a charge level of at least 1.7V. The LED acts as a charge control indicator.
4. For example from wind power with the wind turbine model.

Experimental task 7

You can optimise the electric car by re-installing the solar module and connecting the Goldcap in parallel to the solar module. Note that the red plug on the Goldcap (+) must be connected to the red plug on the solar module.