Question 3 **(6 marks)**

Silicon is a semiconducting material commonly used to make photovoltaic cells.

Manufacturers of a solar-powered watch wanted to determine the work function of the silicon under low levels of artificial light. To test the solar-powered watch, the manufacturer used a light source which emitted photons with wavelengths of 510.6 nm and 578.2 nm.

The photoelectrons emitted were found to have a maximum kinetic energy of 5.36×10^{-20} J.

(a) State why **all** photoelectrons emitted from the silicon do not have the same kinetic energy for a given incident wavelength. (1 mark)

(b) Determine the maximum energy in joules of the highest energy incident photons. (2 marks)

Answer _____ J

(c) Calculate the work function of the silicon in joules. (3 marks)

Answer _____ J