Q- A photoelectric-effect experiment finds a stopping potential of 1.9 V when light of 295 nm is used to illuminate the cathode.
(a) what is the work function of the metal used to made cathode?

If the electrons are to be stopped to move away from the cathode (the plate emitting electrons), this can be done by applying an electric field in the direction of motion of electron and if the potential difference is sufficient, the electrons will be stopped. The value of the retarding potential difference between the two electrodes which is just sufficient to halt the most energetic photoelectrons emitted is called stopping potential.

The charge on electrons is e, if the stopping potential is V then the increase in the electrostatic potential energy of the photo electrons in overcame this potential difference is e*V.

According to law of conservation of energy

The loss in kinetic energy = gain in potential energy hence

Or $\frac{1}{2}mv^2 = e*V$

Substituting the vales in Einstein's equation we have

$\frac{hc}{\lambda} - \phi = eV$

Gives $\phi = \frac{hc}{\lambda} - eV$

Or $\phi = \frac{6.63*10^{-34}*3*10^{8}}{295*10^{-9}} - 1.6*10^{-19}*1.9$

Or $\phi = 6.74*10^{-19} - 3.04*10^{-19} = 3.7*10^{-19}\text{J}$

Or $= 2.31\ \text{eV}$

This value of work function of the material of cathode.

(b) What is the stopping potential if the intensity of the light is doubled?

The maximum kinetic energy of the emitted electron does not change with the intensity of the light (depends on the number of photons) it depends on the frequency or wavelength of the light and hence it remains the same (unchanged)

1.9 V