



KEC

# K Education Centre



## AS Quantum Physics

Quantum Phenomena - Work function and Photo  
electricity

Assignment Questions

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## Quantum Phenomena :

Planck constant ,  $h = 6.63 \times 10^{-34} \text{ Js}$      $1 \text{ eV} = 1.6 \times 10^{-19} \text{ J}$      $c = 3 \times 10^8 \text{ ms}^{-1}$

Q1 : The work function of a metal is 4.32 eV. What is the threshold frequency for photoelectric emission in the metal?

Q2: Explain how the photoelectric effect contradicts the idea that light always behave like a wave .

Q3 : What is work function of a metal , how it is related to threshold frequency?

Q4 : If work function a metal surface is 1.18 eV. Light of wavelength 435 nm (greater than threshold frequency) is directed at the metal surface. Calculate the maximum kinetic energy of the photoelectrons emitted from the metal surface.

Q5 : A vacuum photocell is connected to a micrometer, when light is directed at the photocell, the micrometer reading is  $0.30 \mu\text{A}$ . Calculate the number of photoelectrons emitted by the photocathode of the photocell.

Q6 : Light of wavelength 650 nm is directed at a metal plate at zero potential. Electrons are emitted from the metal plate with the maximum kinetic energy of  $1.4 \times 10^{-19} \text{ J}$ . Calculate :

a) The energy of the photon at this wavelength.

b) Work function of the metal.

c) Threshold frequency of the electromagnetic radiation incident at this metal.

Q7 : If the work function of metal is 3.6 eV . Find the maximum speed of the photoelectron emitted when  $9.3 \times 10^{14} \text{ Hz}$  of light is incident on the surface provided this frequency is more than the threshold frequency of the metal. ( Hint : Find  $E_{k\text{max}}$ )

Q8 : Explain why kinetic energy of most photoelectrons is less than  $E_{k\text{max}}$