Name of the Student:_____

Max. Marks : 22 Marks   **Time : 22 Minutes**

Q1.

(a)   The nucleus of a particular atom has a *nucleon number* of 14 and a *proton number* of 6.

   (i)   State what is meant by nucleon number and proton number.

   nucleon number _____

   _____

   _____

   proton number _____

   _____

   _____

                                                                                      (1)

   (ii)   Calculate the number of neutrons in the nucleus of this atom.

   answer = _____

                                                                                      (1)

   (iii)   Calculate the specific charge of the nucleus.

   answer = _____ Ckg^{-1}

                                                                                      (3)

(b)   The specific charge of the nucleus of another isotope of the element is 4.8×10^{7} Ckg^{-1}.

   (i)   State what is meant by an isotope.

   _____

   _____

   _____

(2)

(ii)   Calculate the number of neutrons in this isotope.

answer = _____

(3)

(Total 10 marks)

Q2.

(a)   When monochromatic light is shone on a clean cadmium surface, electrons with a range of kinetic energies up to a maximum of 3.51×10^{-20} J are released. The *work function* of cadmium is 4.07 eV.

(i)   State what is meant by work function.

_____

_____

_____

_____

(2)

(ii)   Explain why the emitted electrons have a range of kinetic energies up to a maximum value.

_____

_____

_____

_____

_____

_____

(4)

(iii)   Calculate the frequency of the light. Give your answer to an appropriate number of significant figures.

answer = _____ Hz

(4)

(b)   In order to explain the photoelectric effect the wave model of electromagnetic radiation was replaced by the photon model. Explain what must happen in order for an existing scientific theory to be modified or replaced with a new theory.

_____

_____

_____

(2)

(Total 12 marks)