Practice Question Set For A-Level
**Subject : Physics**
**Paper-1 Topic: Particle And Radiation**

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**Name of the Student**:_____
**Max. Marks : 19 Marks** **Time : 19 Minutes**

Mark Schemes

## Q1.

(a) (electron) diffraction / interference / superposition ✓

*Accept derfraction*

**1**

(b) (*use of* $\lambda = h / mv$)
$\lambda = 6.63 \times 10^{-34} / (9.11 \times 10^{-31} \times 2.5 \times 10^{5})$ ✓
$\lambda = 2.9 \times 10^{-9}$m ✓ ✓ (2 sig figs.)

**3**

(c) $v = 2.5 \times 10^{5} / 207$ ✓
$v = 1200$ m s$^{-1}$ ✓
OR use $v = h / m\lambda$ with CE from part (b)

*Answer alone gets 2 marks*

**2**

**[6]**

## Q2.

(a) (i) ultraviolet / UV / UV light / ultra(-)violet ✓

**1**

(ii) <u>electron</u>( in ground state ) has moved / in to higher (energy) level / shell / orbital / state OR up level / shell / orbital / state ✓

*Ignore reference to photons*

**1**

(iii) (free) electrons collide with orbital electrons / mercury electrons / electrons in atom ✓
transferring energy ✓

*Ignore any reference to photons*

**2**

(iv) (mercury) atoms have discrete / fixed / specific energy levels ✓
when electrons change levels they lose an exact / fixed / specific / discrete / set amount of energy OR photons emitted with exact / fixed / specific / discrete / set amount of energy ✓
(leading to photons of) fixed / particular / certain / discrete / specific / unique frequencies ✓

*Each mark independent*
*Don't accept characteristic for 3rd mark*

**3**

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(b) (i) (*use of* $\lambda = c / f$)

$f = 3 \times 10^{8} / (254 \times 10^{-9})$ ✓

$f = 1.18 \times 10^{15}$ (Hz) ✓

*AE penalty if give answer to 1 sig fig*

**2**

(ii) (*use of* $E = hf$)

$E = 6.63 \times 10^{-34} \times 1.18 \times 10^{15} = 7.82 \times 10^{-19}$J ✓

$E = 7.82 \times 10^{-19} / 1.6 \times 10^{-19}$ ✓ = 4.9 (4.875) eV

*CE part (i)*

*Range 4.8 − 5.0 acceptable*

**2**

(c) coating <u>absorbs</u> photons / uv light ✓

and re-emits (photons) of low(er) energy / long(er) wavelength / low(er) frequency ✓

*Ignore any description of mechanism*

**2**

**[13]**

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