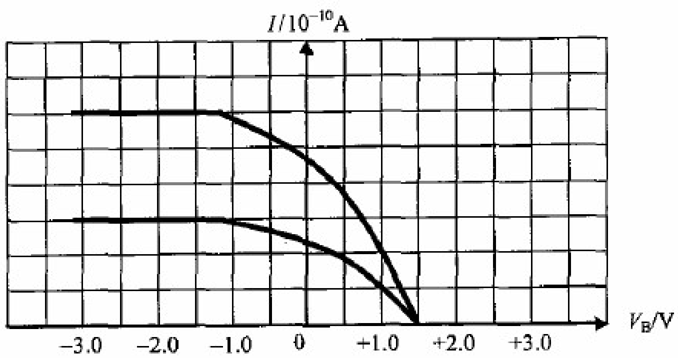
SECTION B: Atomic World (20 marks, 10% of subject mark)

Multiple-choice questions

2.1 B
2.2 C
2.3 D
2.4 A
2.5 B
2.6 A
2.7 C
2.8 D

Structured question

(a)	Photoelectrons are emitted from B with non-zero (or enough) kinetic energies / speeds and thus they can reach the anode.	1A	
	Current is from A to B (or to the right) within the photocell.	1A	2
(b) (i)	Those photoelectrons with kinetic energies less than eV_B	1A	
	do not have enough energy to overcome the potential barrier in order to reach anode A, hence the current drops.	1A	2
	Or Those photoelectrons emitted with speeds less than v_o where $\frac{1}{2}m_e v_o^2 = eV_B$ could not overcome the attraction towards B, hence the current drops.		
(ii)	1.5 (eV)	1A	
	$h\frac{c}{\lambda} = \Phi + \text{K.E.}_{max}$	1M	
	$\frac{3\times10^8\ \text{ms}^{-1}}{\lambda} = \frac{(2.3\ \text{eV} + 1.5\ \text{eV})}{6.63\times10^{-34}\ \text{J s}}$		
	$\lambda = 327$ nm	1A	
	Ultraviolet (UV)	1A	4
(c)		2A	2

SECTION C: Energy and Use of Energy (20 marks, 10% of subject mark)

Multiple-choice questions

3.1 D

3.2 B

3.3 B

3.4 A

3.5 C

3.6 C

3.7 D

3.8 A

Structured question

(a) (i) The energy stored per kg is $mc\Delta T = 1 \times 4200 \times (100 - 25) = 315$ kJ. 1M +1A

(ii) Molten salt X is preferred. 1A

The energy stored per kg for molten salt X is higher as it has a higher boiling, despite its lower specific heat capacity. 1A

(b) (i) The electrical energy is converted into the potential energy of the water. 1A

(ii) The potential energy of the water is converted into the electrical energy. 1A

(c) (i) Wind energy may not have a steady output as it depends on the weather. A pumped storage can act as a backup to provide a more steady electrical output. 1A

(ii) It requires an upper reservoir and a lower reservoir separated by a certain vertical distance and the reservoirs have to store a significant amount of water. 1A

(d) In every second, the potential energy gained by the water is equal to the excess energy times the efficiency:

$(m)(9.81)(200) = 10\ 000 \times 80\%$ 1M

$\therefore\ m = 4.077$ kg

In an hour, the mass of water pumped is $4.077 \times 60 \times 60 = 14\ 700$ kg. 1A