Practice Question Set For A-Level
**Subject : Physics**
**Paper-1 Topic : 7_ Electric Field**



**Name of the Student**:_____
**Max. Marks : 18 Marks** **Time : 18 Minutes**

Mark Schemes

**Q1.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| | D | | 1 |

**Q2.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| | **The only correct answer is B**<br>A is not the correct answer, as $2Q/(2d)^2$ simplifies to $F/2$.<br>C is not the correct answer, as $2Q/(2d)^2$ simplifies to $F/2$.<br>D is not the correct answer, as $2Q/(2d)^2$ simplifies to $F/2$. | | 1 |

**Q3.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| | • Equates $F=Bev$ and $F=eE$ (1)<br><br>• Substitutes $E = V/d$ (1)<br>**Or** $F = eV/d$ seen<br><br>• Replaces $v$ with $I/neA$ (1)<br><br>• Substitute $A = d \times t$ and leads to given equation (1)<br><br>Alternative:<br><br>• Equates $F = BIl$ and $F = QE$ with $Q$ identified as total charge (1)<br><br>• Substitutes $E = V/d$<br>**Or** $F = QV/d$ seen<br><br>• Substitutes $Q = neAl$ and cancels $l$<br><br>• Substitute $A = d \times t$ and leads to given equation | Example of derivation:<br>$Bev = eE$<br><br>$Bev = eV/d$<br>$\frac{BI}{neA} = \frac{V_H}{d}$<br>$V_H = \frac{BI}{net}$<br><br>Alternative:<br>$BIl = QE$<br>Total charge $Q = neAl$<br>$BIl = neAlE$<br>$BI = neAV_H/d$<br>$V_H = BI/net$ | (4) |

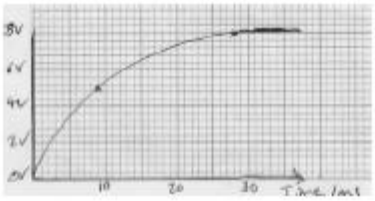
**Q4.**

| Question number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| (i) | • use of $F = Q_1Q_2/4\pi\varepsilon_0r^2$ **(1)**<br>• use of $F = Gm_1m_2/r^2$ **(1)**<br>• Expresses forces as a ratio **(1)** **OR** calculates the individual forces $F_e = 8.1 \times 10^{-8}$ N $F_g =$<br>• $3.6 \times 10^{-47}$ N **(1)**<br>• Ratio = $2 \times 10^{39}$ or $5 \times 10^{-40}$ and identifies gravitational force as insignificant **(1)** | | **4** |
| (ii) | • use of $F = mv^2/r$ and $F = Q_1Q_2/4\pi\varepsilon_0r^2$ **(1)**<br>• to derive $v = \sqrt{\frac{Q_1Q_2}{4\pi\epsilon_0rm}}$ **(1)**<br>• velocity = $2.2 \times 10^6$ m s$^{-1}$ **(1)** | Example of calculation:<br>$v = \sqrt{\frac{Q_1Q_2}{4\pi\epsilon_0rm}}$<br>$v = \sqrt{\frac{1.6\times10^{-19}\text{ C}\times1.6\times10^{-19}\text{ C}}{4\pi\times8.85^{-12}\text{ Fm}^{-1}\times5.3\times10^{-11}\text{m}\times9.1\times10^{-31}\text{ kg}}}$<br>$v = 2.185 \times 10^6$ m s$^{-1}$ | **3** |

**Q5.**

| Question Number | Answer | Mark |
|---|---|---|
| | A | **1** |

**Q6.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| | • line approximately exponential curve starting at 0 and increasing potential **(1)**<br>• beginning to flatten off at a maximum of 8 V (at 30 ms above 7.5 V) **(1)**<br>• Use of time constant *RC* **(1)** |  <br>This can be evidenced with an exponential curve passing through about 5 V at 9 ms **Or** approximately 2/3 of their maximum | **3** |

**Q7.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| | • Charged particle/hair attracts/repels **(1)**<br>**Or** charged/hair experiences a force | | **(1)** |