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

Mark Schemes

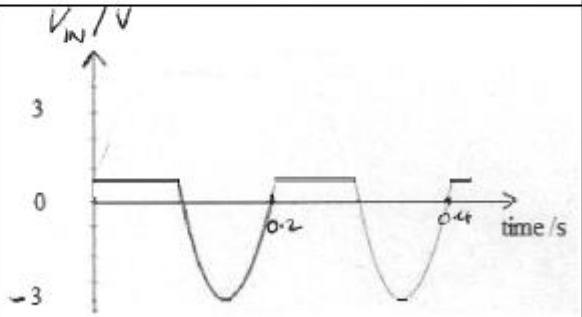
**Q1.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| (i) | • $V$rms = 3.5 V (1) | Example of calculation<br>$V_{rms} = \frac{5}{\sqrt{2}} = 3.54$ V | 1 |
| (ii) | An explanation that makes reference to the following points:<br>• "5" is the peak value (of pd) (1)<br>• Use of $T = 1/f$ **Or** $\omega = 2\pi/T$ **Or** $\omega = 2\pi f$ (1)<br>• Uses $\omega = 100\pi$ to show that the time period should be 0.02 s **Or** Uses $f = 50$ to show that sin $2\pi ft$ is sin $100\pi t$ **Or** Uses $T = 0.02$ to show that $100\pi 0.02 = 2\pi$ (1) | Accept max for peak<br>Alternative MP2: recognises that one period/cycle of the sine wave is an angle of $2\pi$ | 3 |

**Q2.**

| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| (i) | • Use of $V_{rms} = \frac{V_0}{\sqrt{2}}$ (1)<br>• $V_{rms}$ = 2.4 V (1) | Example of calculation:<br>$V_{rms} = \frac{3.4}{\sqrt{2}} = 2.4$ V | (2) |

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| Question Number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| (ii) | • Energy is conserved **Or** Kirchoff's law **Or** potential difference is energy per unit charge (1)<br>• So the sum of p.d.s in a series circuit must equal the e.m.f. applied (1)<br>(MP2 is dependent on MP1) | accept work done for energy<br>accept $V_{in}$ for emf<br>Alternative:<br>Current is the same in both components (1)<br>$IV_{IN} = IV_R + IV_D$ and $I$ cancels (1) | (2) |
| (iii) | • Alternate half cycles of sine curve (with peak about 3 V) (1)<br>• Horizontal line in 1st half cycle and negative half cycle of a sine curve in 2nd half cycle (1)<br>• horizontal lines/spaces at a value of potential difference of 0.6 V to 0.8 V (1) |  | (3) |

**Q3.**

| Question number | Acceptable answers | Additional guidance | Mark |
|---|---|---|---|
| (i) | • Use of ½ $mv^2 = mgh$ **(1)**<br>• $v = 2.43$ m s$^{-1}$ **(1)** | Example of calculation:<br>$v = \sqrt{2gh} = \sqrt{2 \times 9.81 \times 0.30} = 2.43$ m s$^{-1}$ | **2** |
| (ii) | • Use of impulse = change in momentum **(1)**<br>• Recognises initial velocity is zero **(1)**<br>• Hence $F = 0.923$ N **(1)**<br>• Use of $l = \pi d$ **(1)**<br>• Equates calculated value of $F$ with $BIl$ **(1)**<br>• Hence I = 191 A **(1)** | Example of calculation:<br>$Ft = mv - mu$ where $u = 0$<br>So $F = (0.019$ kg $\times$ 2.43 m s$^{-1})/0.05$ s $= 0.923$ N<br>$l = \pi \times 0.048$ m $= 0.151$ m<br>$I = 0.923$ N$/(0.032$ T $\times 0.151$ m$) = 191$ A | **6** |

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